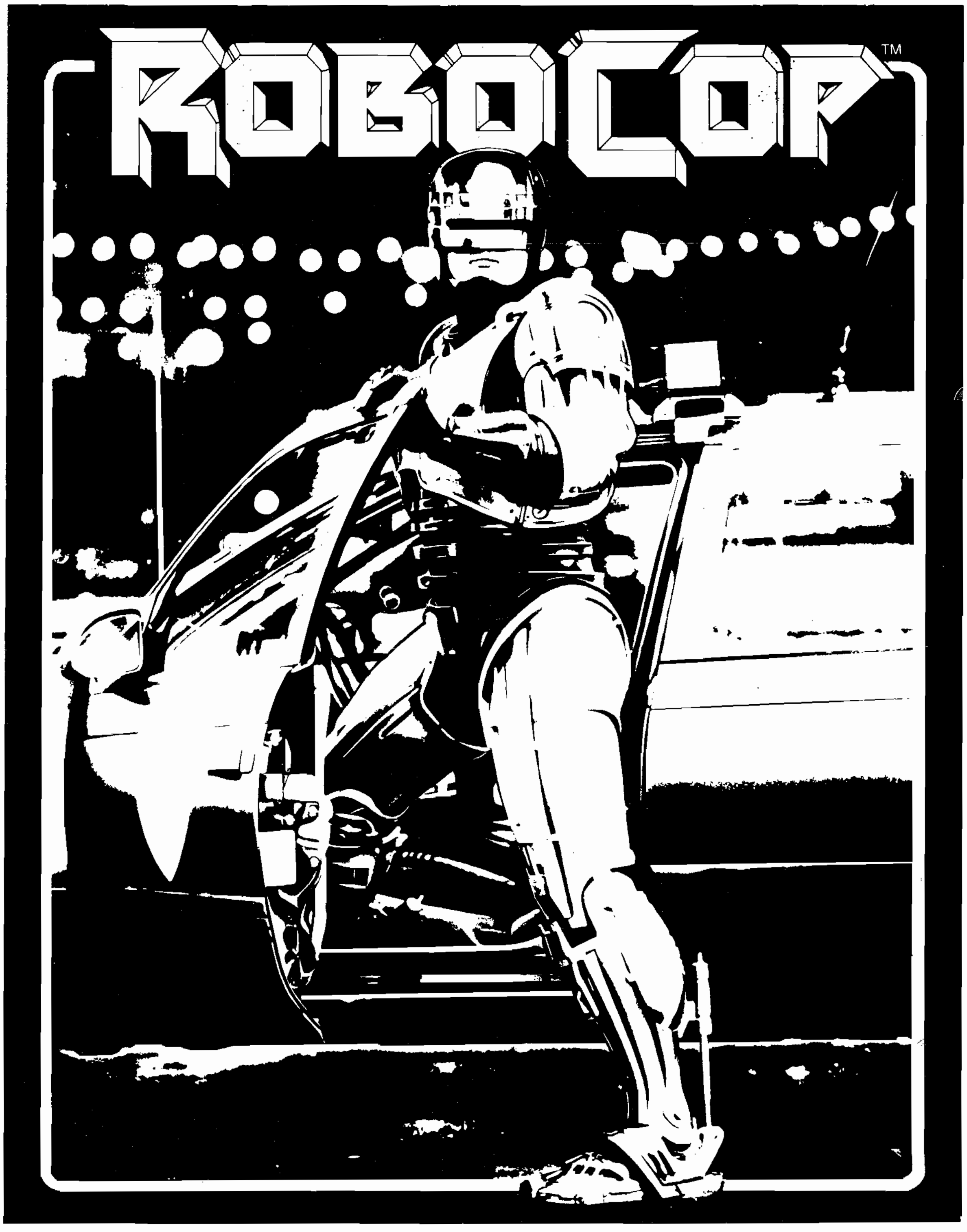
TECHNICAL SUPPORT MANUAL
and Schematic Diagrams



DATA EAST USA, INC.
470 Needles Drive
San Jose, California 95112
Telephone (408) 286-7080

780-0116-00

FCC WARNING

This equipment generates and uses radio frequency energy and if not installed and used properly, ie; in strict accordance with this instructions manual, may cause harmful interference to radio communications. This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment.

Operation of this equipment in a residential environment is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures are necessary to correct the interference.

FBI WARNING

Federal law provides severe civil and criminal penalties for the unauthorized reproduction, distribution, or exhibition of copyrighted audio-visual works and video games. The Federal Bureau of Investigation investigates allegations of criminal copyright infringemant.

COPYRIGHT NOTICE

ENVIRONMENTAL DATA

This product is intended for use indoor use only, power requirements are 105-125 volts AC, 50-60 hz, and requires a 3 wire grounded outlet.

SERVICE PROCEDURES

To obtain replacement parts and technical service, contact the authorized Data East Distributor in your area. If you require referral or further technical assistance, you may contact Data East's Customer Service department during the hours of 8:00 am to 5:00 pm Pacific Time at (408) 286-7074.

AAMA WARNING

DATA EAST USA, INC., in cooperation with the American Amusement Machine Association, has installed an "AAMA PROTECT" certification label on each ROBOCOP PCB manufactured for legal sale in the United States of America.

If you are offered a ROBOCOP PCB that does not have the "AAMA PROTECT" certification label, you should suspect that the board is not legal, and should contact DATA EAST USA, INC., at (408) 286-7074, or Bob Fay of the AAMA at (703) 548-8044.

1. SYSTEM OVERVIEW

The ROBOCOP™ Board Set consists of a Main CPU pcb (DE297) and a Game Program pcb (DE316), interconnected by two 96 pin connectors. The Main CPU pcb controls all graphics and sound functions, whereas the Game Program pcb contains all game specific Eproms and unique I/O circuitry.

Graphics: This game has 4 levels (or planes) of graphics; Moving Objects MIX (or Sprite character video), Back 0 (back-ground video), Back 1, and Back 2. The Back 2 plane is generated on the Game Program pcb and injected into the Main CPU pcb prior to the final video summing. Three BAC06 custom gate-array IC's control the three background video planes, and the MXC06 custom gate-array IC controls the Moving Object video plane.

Sound: The game sounds are provided by the Yamaha Sound sub-system, and has the capability to mix in sound from an outside source. In the case of ROBOCOP™, the outside source is the OKI Voice Synthesizer found on the Game Program pcb. The voice sounds are injected into the final amplifier on the Main CPU pcb via a 6 pin cable between the two pcbs. The 68000 cpu writes an 8-bit word to the 6502A Sound cpu, which is programmed to generate a unique sound. Again, all sound program and data storage is on the Game Program pcb.

Input/Output: The ROBOCOP™ Main CPU pcb contains 21 general purpose switch inputs, 2 dedicated Coin Switch inputs, 16 dipswitch inputs, 2 CPU controlled open collector outputs, and 2 dedicated Coin Counter open collector outputs.

2. PARTS LIST

MAIN CPU PCB, DE-0297

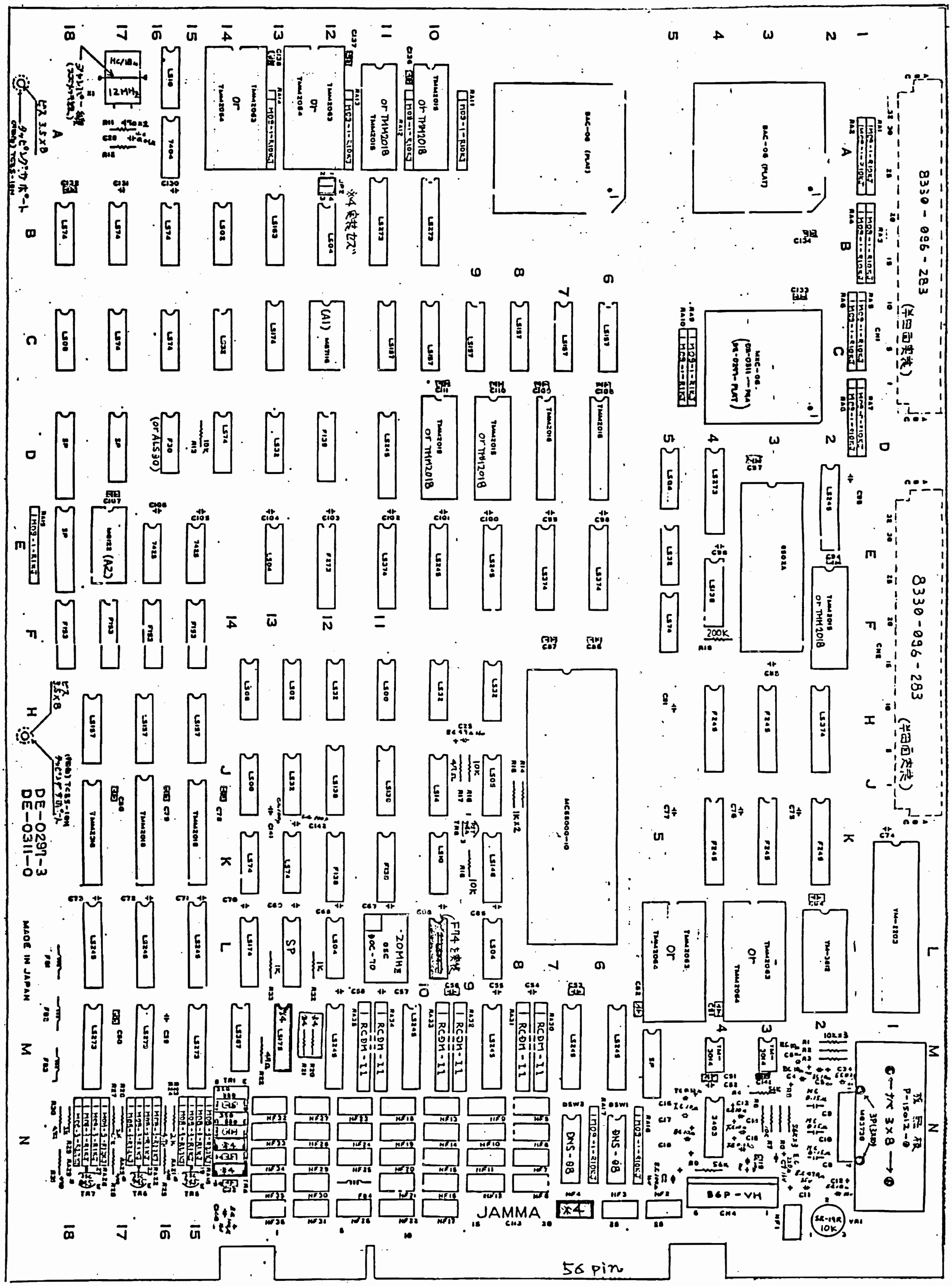
TYPE	DESCRIPTION	PART NUMBER	QTY
TTL	7404	100-0007-00	1
TTL	7425	100-0214-00	2
TTL	74LS00	100-0025-00	2
TTL	74LS02	100-0026-00	2
TTL	74LS04	100-0027-00	5
TTL	74LS05	100-0005-00	1
TTL	74LS08	100-0028-00	2
TTL	74LS10	100-0029-00	2
TTL	74LS14	100-0030-00	1
TTL	74LS32	100-0034-00	7
TTL	74LS74	100-0037-00	10
TTL	74LS138	100-0042-00	3
TTL	74LS148	100-0044-00	1
TTL	74LS157	100-0046-00	9
TTL	74LS163	100-0049-00	1
TTL	74LS174	100-0051-00	2
TTL	74LS245	100-0058-00	12
TTL	74LS273	100-0060-00	6
TTL	74LS367	100-0062-00	1
TTL	74LS374	100-0064-00	4
TTL	74F30	100-0033-04	1
TTL	74F138	100-0042-04	2
TTL	74F139	100-0043-04	1
TTL	74F153	100-0045-04	4
TTL	74F273	100-0060-04	1
TTL	74F245	100-0058-04	5
CPU	MC68000-10	100-0232-00	1
CPU	6502A	100-0099-01	1
CUSTOM	BAC06, 144 PIN	100-0234-00	2
CUSTOM	MXC06, 132 PIN	100-0245-00	1
RAM	TMM2063-10	100-0081-00	4
RAM	TMM2015-10	100-0082-00	5
RAM	TMM2018-45	100-0035-00	5
LINEAR	YM-2203 OPN	100-0123-00	1
LINEAR	YM-3014 DAC	100-0179-00	2
LINEAR	YM-3812 OPL	100-0208-00	1
LINEAR	UA3403 (LM324)	100-0124-00	1
LINEAR	MB3730 PWR AMP	100-0081-00	1

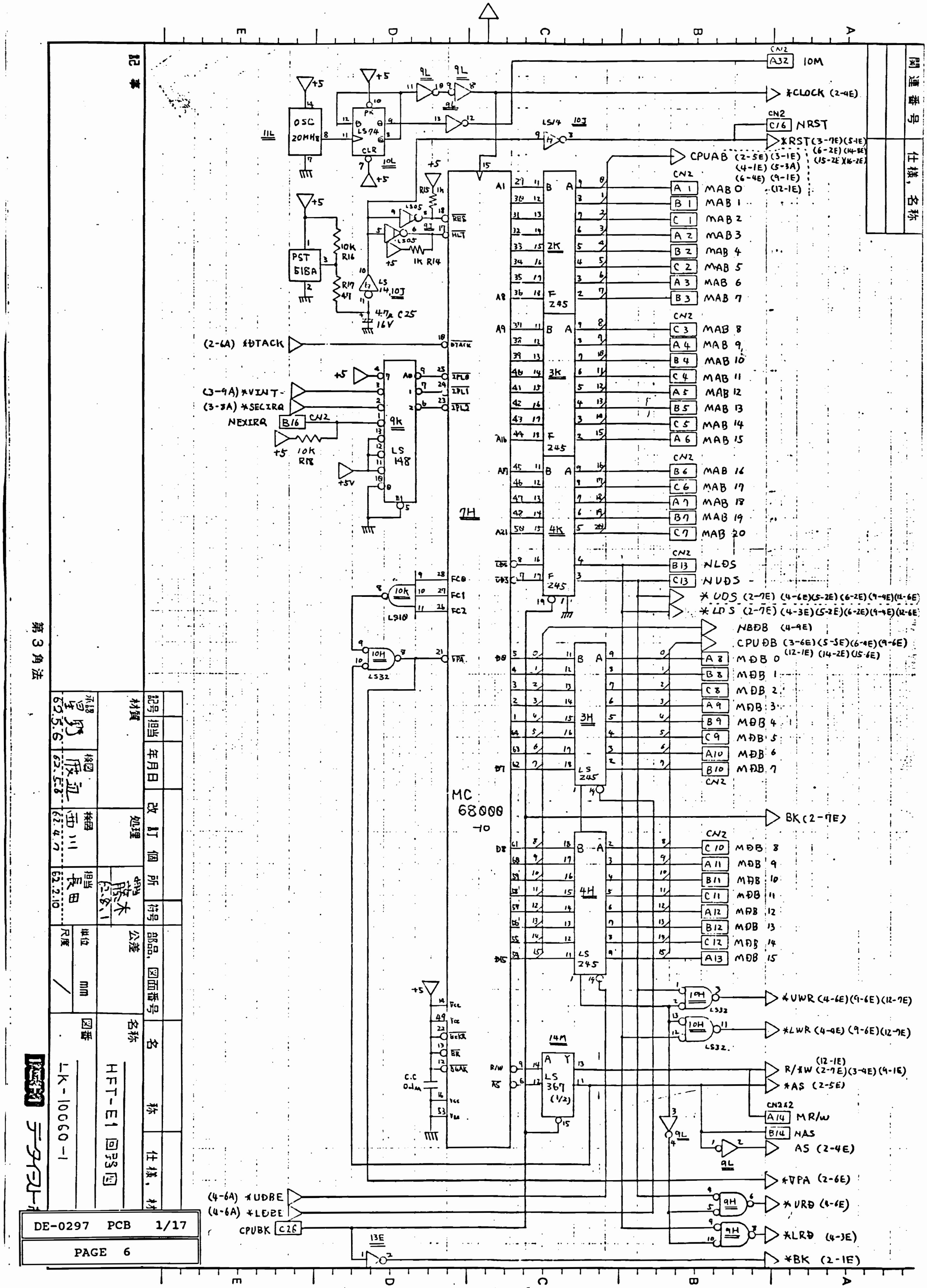
MAIN CPU PCB, DE-0297

LINEAR	PST518	110-0065-00	1
XTAL	12 MHZ	140-0003-00	1
XTAL OSC	20 MHZ	140-0010-00	1
XISTOR	2SC945	110-0016-00	1
XISTOR	2SD880	110-0044-00	1
RESNET	RCDM-I1	100-0185-00	6

GAME PROGRAM PCB DE-0316-3

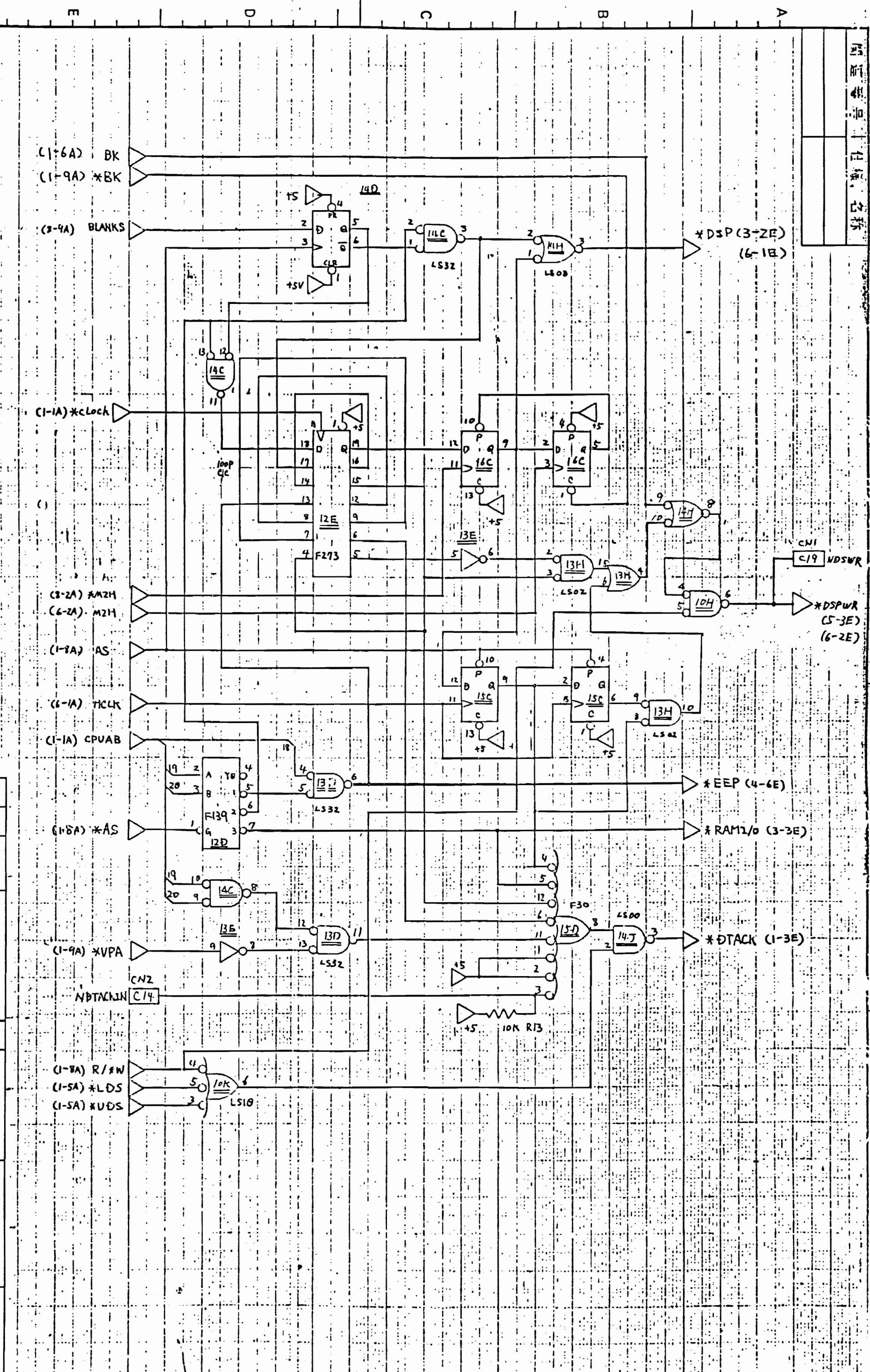
TYPE	DESCRIPTION	PART NUMBER	QTY
PROMS	27512	105-0080-00	24
CUSTOM	BAC-06	100-0234-00	1
CUSTOM	DEM-01	100-0257-00	1
CUSTOM	DEC-01	100-0256-00	1
LINEAR	6295	100-0248-00	1
LINEAR	4558	100-0084-00	1
RAM	2018	105-0035-00	3
TTL	74LS273	100-0060-00	6
TTL	74LS373	100-0111-00	2
TTL	74LS374	100-0064-00	1
TTL	74LS04	100-0027-00	2
TTL	74F32	100-0034-00	2
TTL	74F139	100-0043-04	1
TTL	74LS08	100-0028-00	1
TTL	74LS04	100-0027-00	1
TTL	74LS74	100-0037-00	1
TTL	74F74	100-0037-04	1
TTL	74LS390	100-0247-00	1
PAL	PY-1	105-0086-00	1
PAL	PY-0	105-0087-00	1
ROM	EN-24	105-0085-00	1


8330-096-283
8330-096-283
DE-0297-3
DE-0311-0
MADE IN JAPAN
JAMMA
56 pin



DE-0297 PCB 1/17

PAGE 6

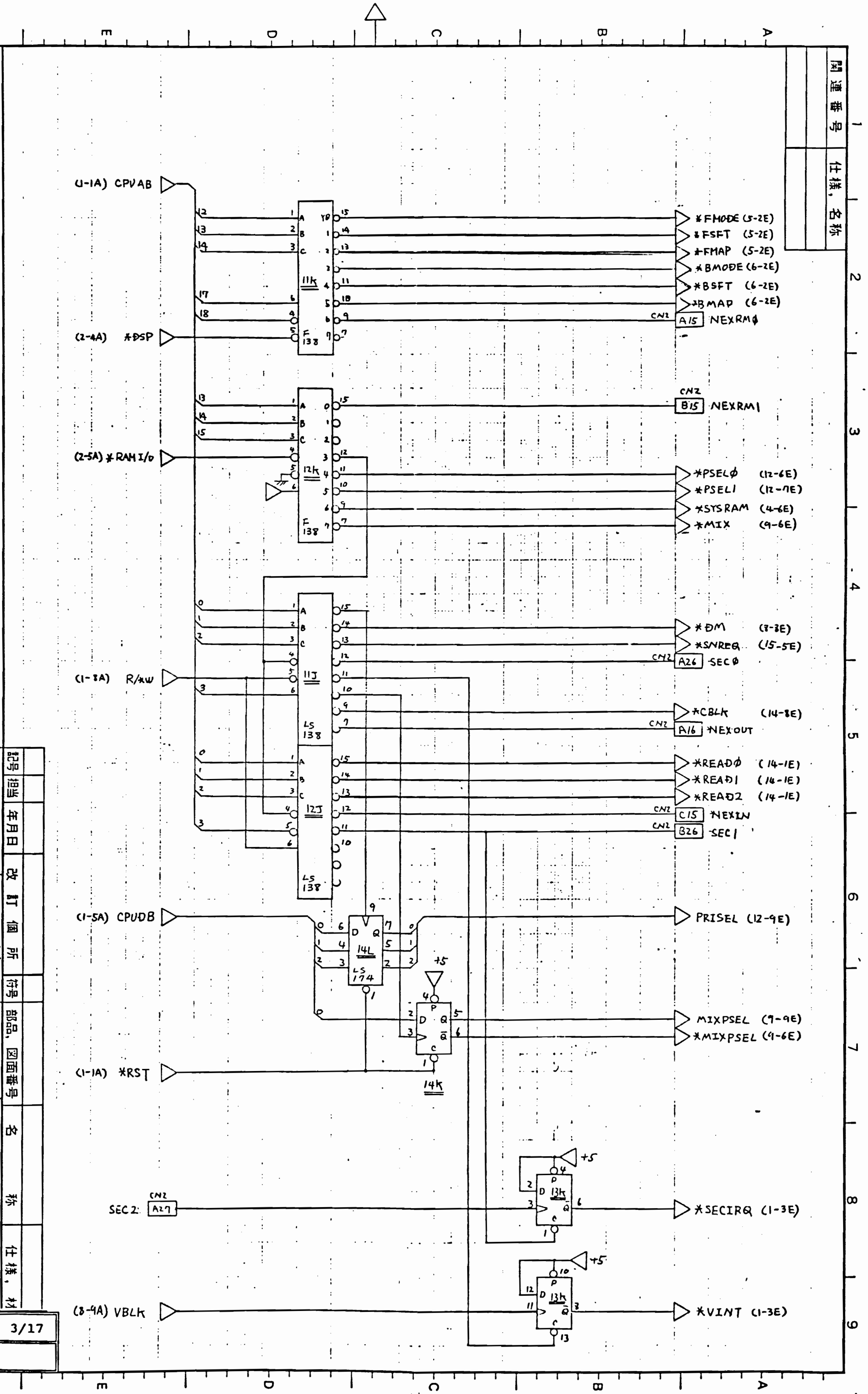


第3角法

HFT-E1 回路図

LK-10060-1

データイースト



記号	担当	年月日	改訂個所	符号	部品、図面番号	名称	仕様、材

材質

処理 62.8.1

製図 62.5.6 / 検図 62.5.6 / 承認 62.4.7 / 担当 62.2.16

公差

単位 mm

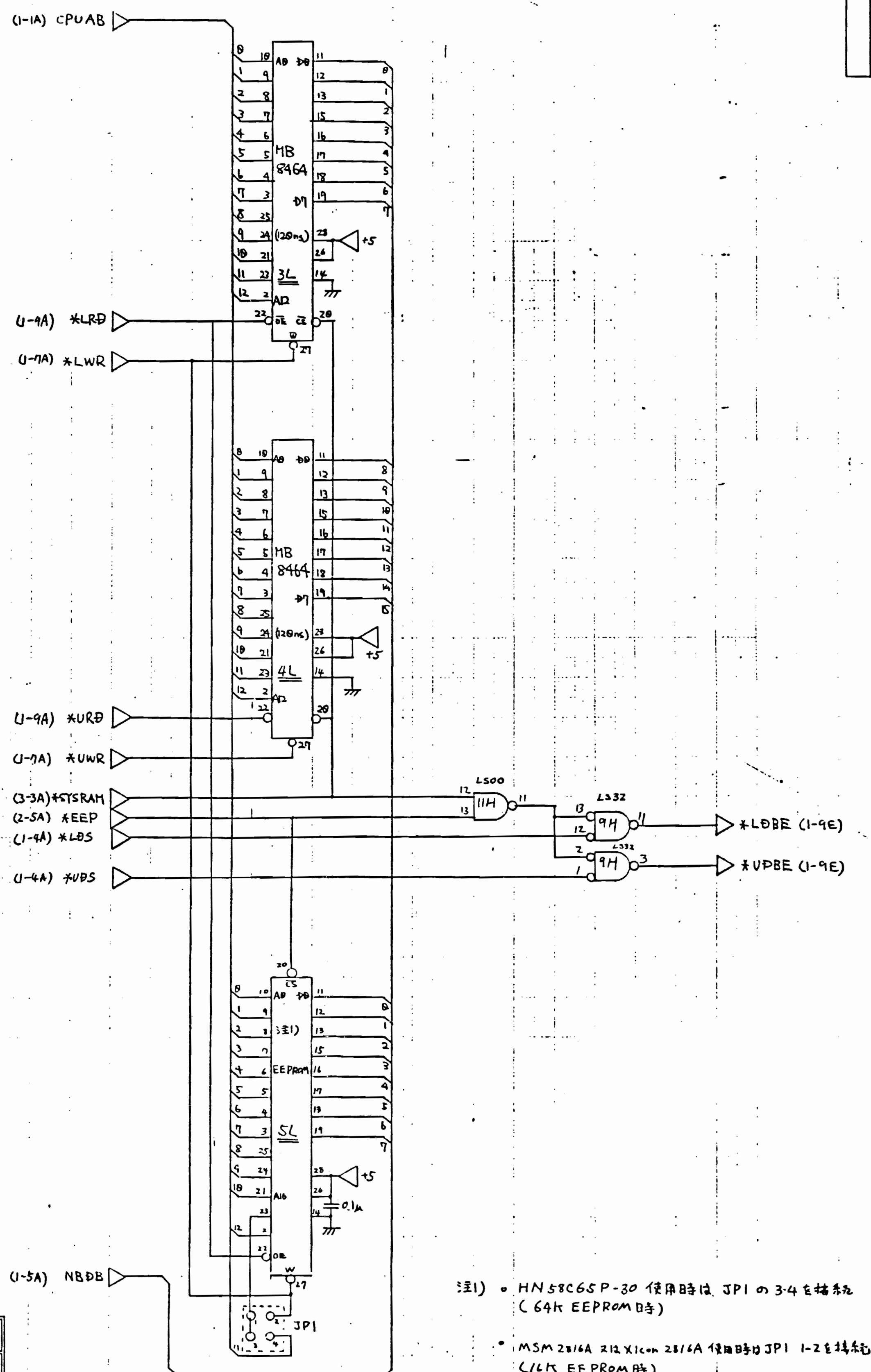
尺度 /

名称 HFT-E1 回路図

図番 LK-10060-1

データイースト

DE-0297 PCB 3/17



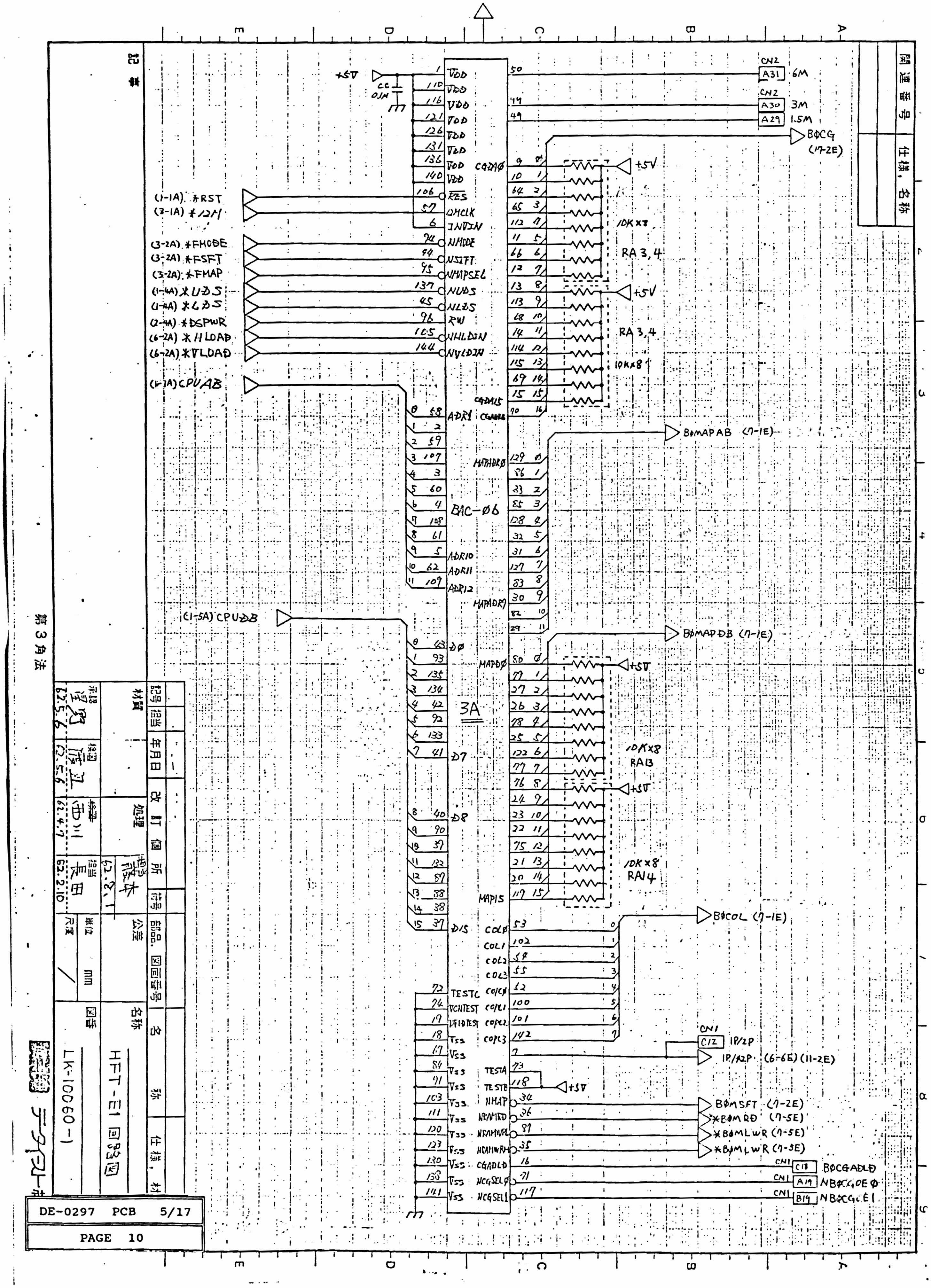
注1) ○ HN58C65P-30 使用時は JP1 の 3-4 を接続
(64k EEPROM 時)

• MSM2816A 又は Xicon 2816A 使用時は JP1 1-2 を接続
(16k EEPROM 時)

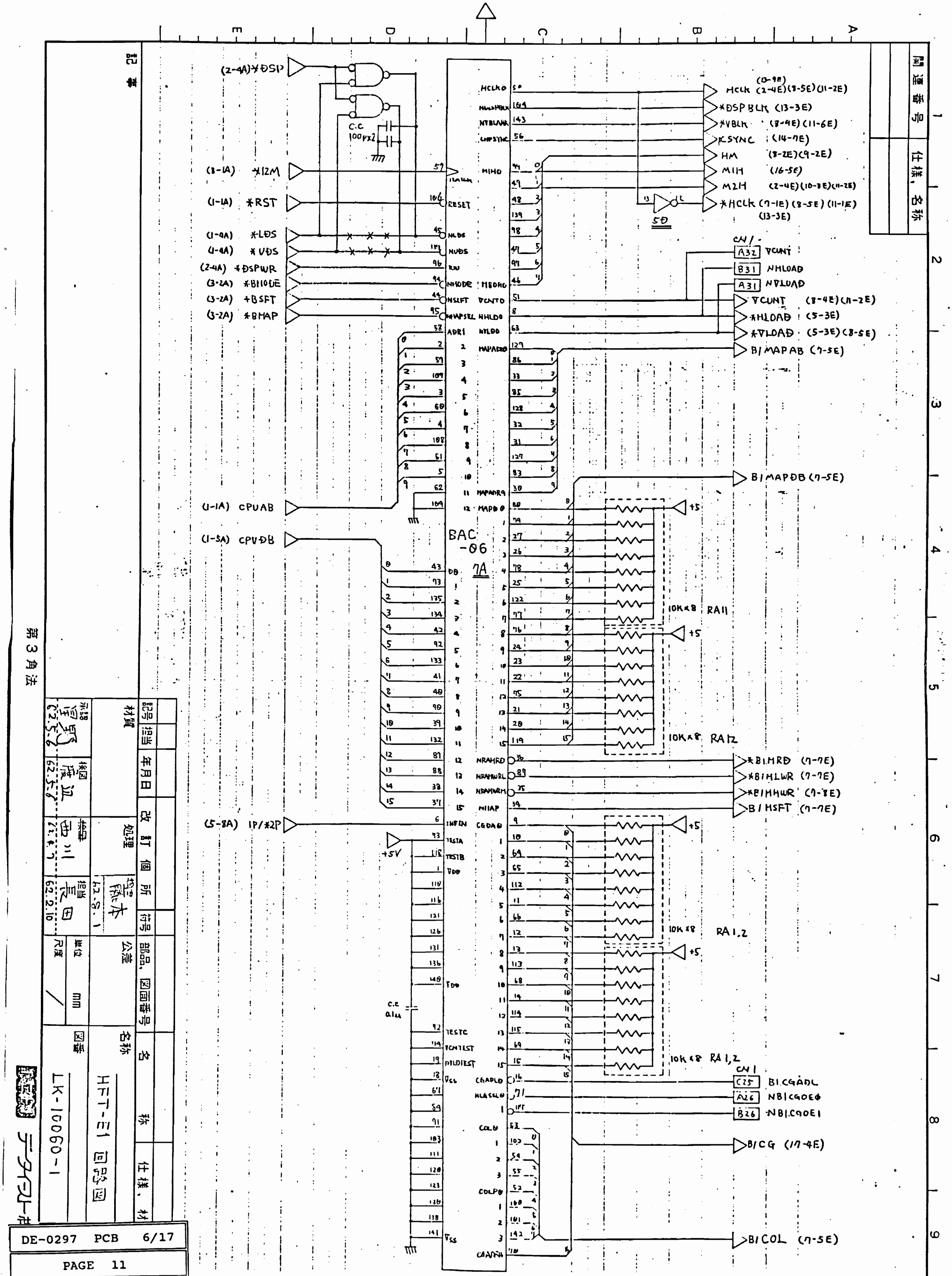
名称	HFT-E1 回路図
図番	LK-10060-1

データイースト

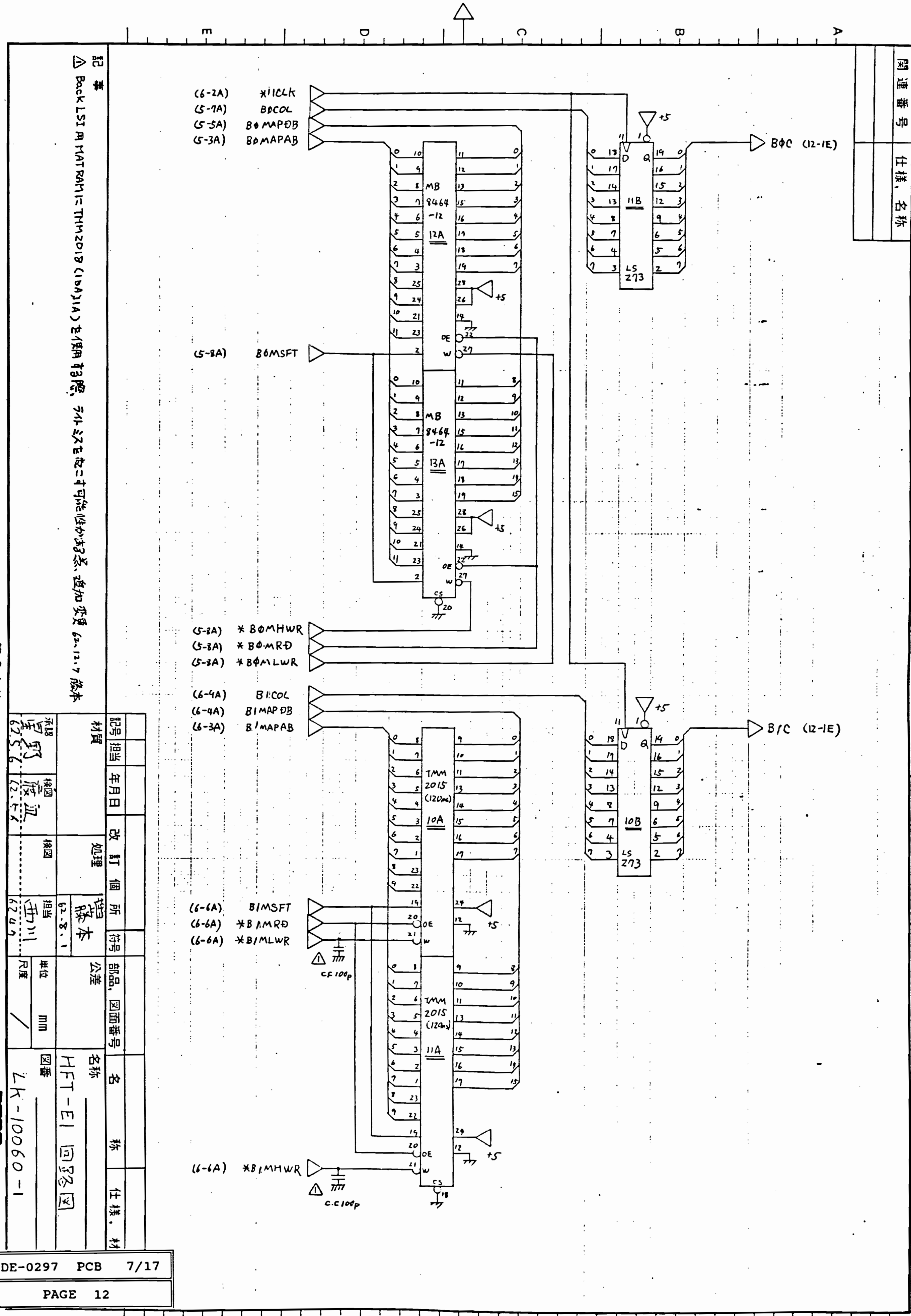
DE-0297 PCB 4/17



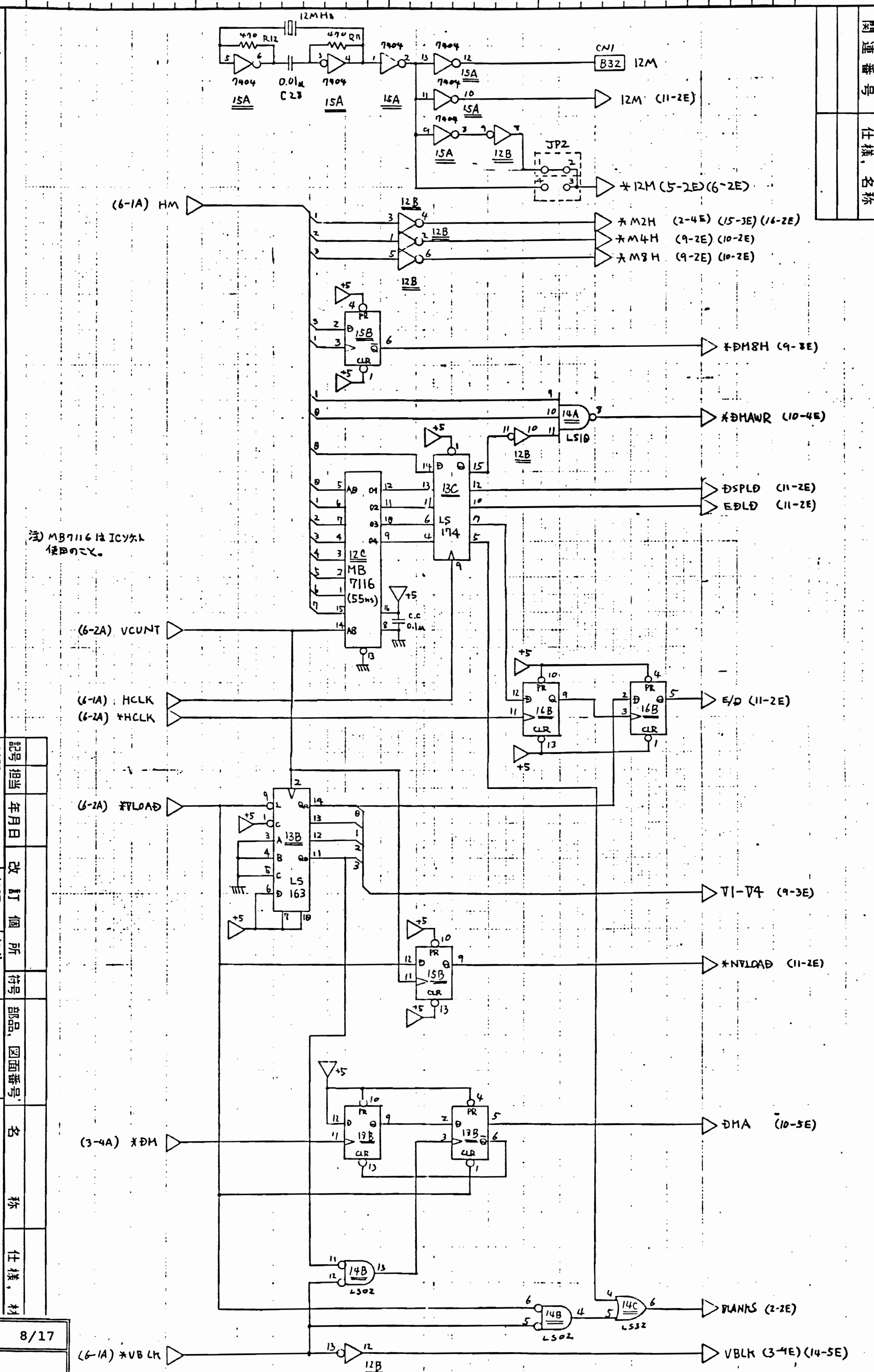
BAC-06
3A
VDD
RES
UMCLK
INDIN
NMODE
NSIFT
NMPSEL
NUDS
NLDS
RW
NHLDIN
NVLDIN
ADR1
ADR10
ADR11
ADR12
D0
D7
D8
D15
TESTC
VCNTEST
VFIDTEST
VSS
CGDA0
CGDA15
MAPADR0
MAPADR11
MAPD0
MAPD15
COL0
COL1
COL2
COL3
COLC0
COLC1
COLC2
COLC3
TESTA
TESTB
NMAP
NRAMRD
NRAMWRL
NRAMWRH
CGADLD
NCGSEL0
NCGSEL1
+5V
(1-1A) *RST
(3-1A) *12M
(3-2A) *FMODE
(3-2A) *FSFT
(3-2A) *FMAP
(1-4A) *UDS
(1-4A) *LDS
(2-4A) *DSPWR
(6-2A) *HLOAD
(6-2A) *VLOAD
(1-1A) CPUAB
(1-5A) CPUDB
CN2 A31 6M
CN2 A30 3M
A29 1.5M
B0CG (7-2E)
10K×8
RA3,4
RA3
RA4
B0MAPAB (7-1E)
B0MAPDB (7-1E)
B0COL (7-1E)
CN1 C12 1P/2P
1P/X2P (6-6E) (11-2E)
B0MSFT (7-2E)
*B0MRD (7-5E)
*B0MLWR (7-5E)
*B0MLWR (7-5E)
CN1 C13 B0CGADLD
CN1 A19 NB0CGOE0
CN1 B19 NB0CGCE1
第3角法
名称 HFT-E1 回路図
図番 LK-10060-1
単位 mm
62.5.6
62.4.7
62.2.10



DE-0297 PCB 6/17



(6-2A) *ilCLK
(5-7A) BΦCOL
(5-5A) BΦMAPDB
(5-3A) BΦMAPAB
MB 8464 -12 12A
MB 8464 -12 13A
(5-8A) BΦMSFT
(5-8A) *BΦMHWR
(5-8A) *BΦMRD
(5-8A) *BΦMLWR
11B LS 273
BΦC (12-1E)
(6-4A) B1COL
(6-4A) B1MAPDB
(6-3A) B1MAPAB
TMM 2015 (120ns) 10A
TMM 2015 (120ns) 11A
(6-6A) B1MSFT
(6-6A) *B1MRD
(6-6A) *B1MLWR
(6-6A) *B1MHWR
C.C 100p
10B LS 273
B1C (12-1E)
記事
△ Back LSI用MATRAMにTMM2018(10A)(11A)を使用する際、ライトミスを起こす可能性がある為、追加変更 62.12.7 藤本
第3角法
HFT-E1 回路図
LK-10060-1
データイースト



記号	担当	年月日	改訂個所	符号	部品、図面番号	名称	仕様、材

材質

製図 星野 62.5.6

検図 渡辺 62.5.6

検印 西川 62.4.7

担当 長田 62.2.10

処理 藤本 62.8.1

公差

単位 mm

尺度 /

名称 HFT-E1 回路図

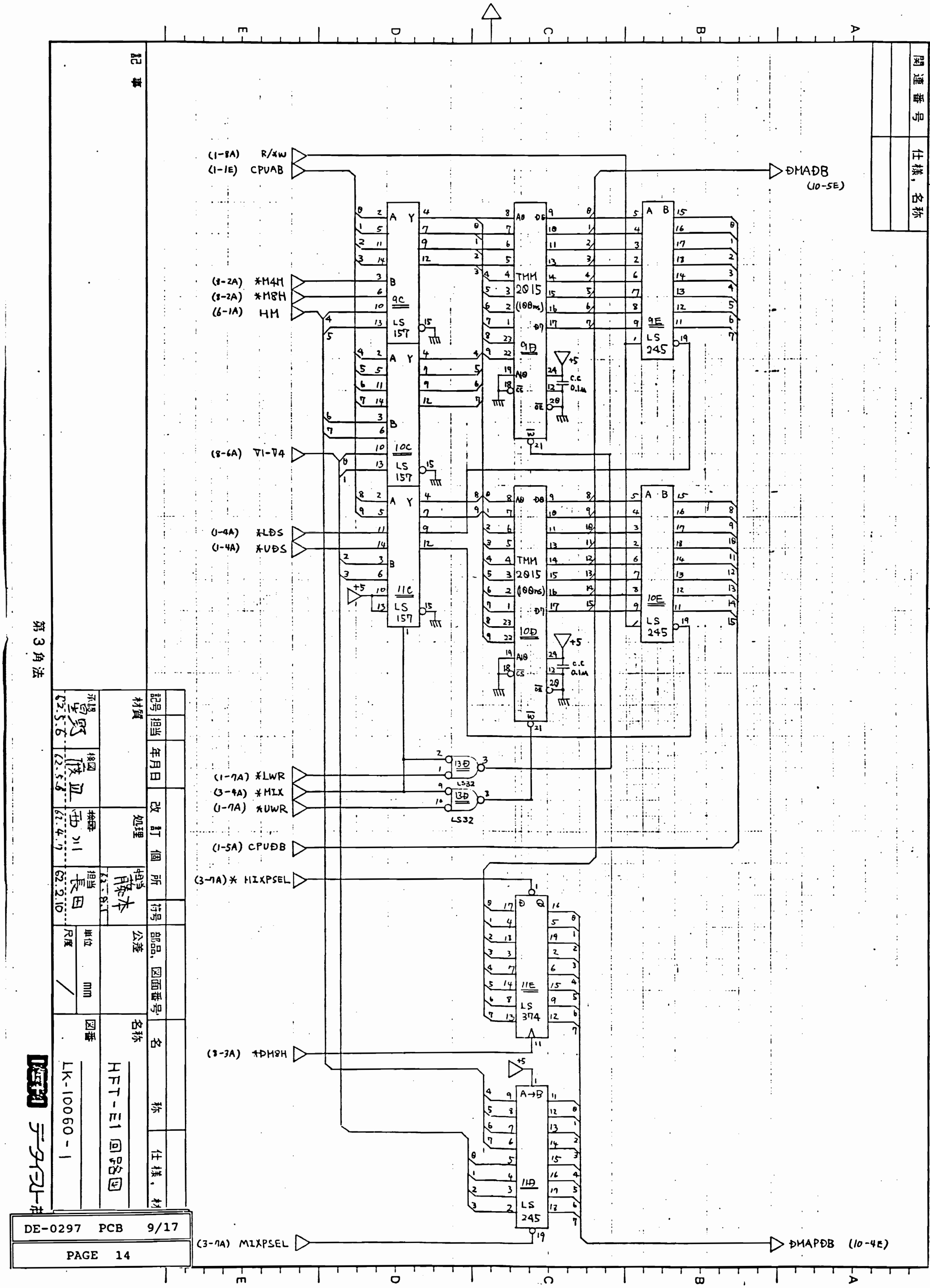
図番 LK-1006G-1

第3角法

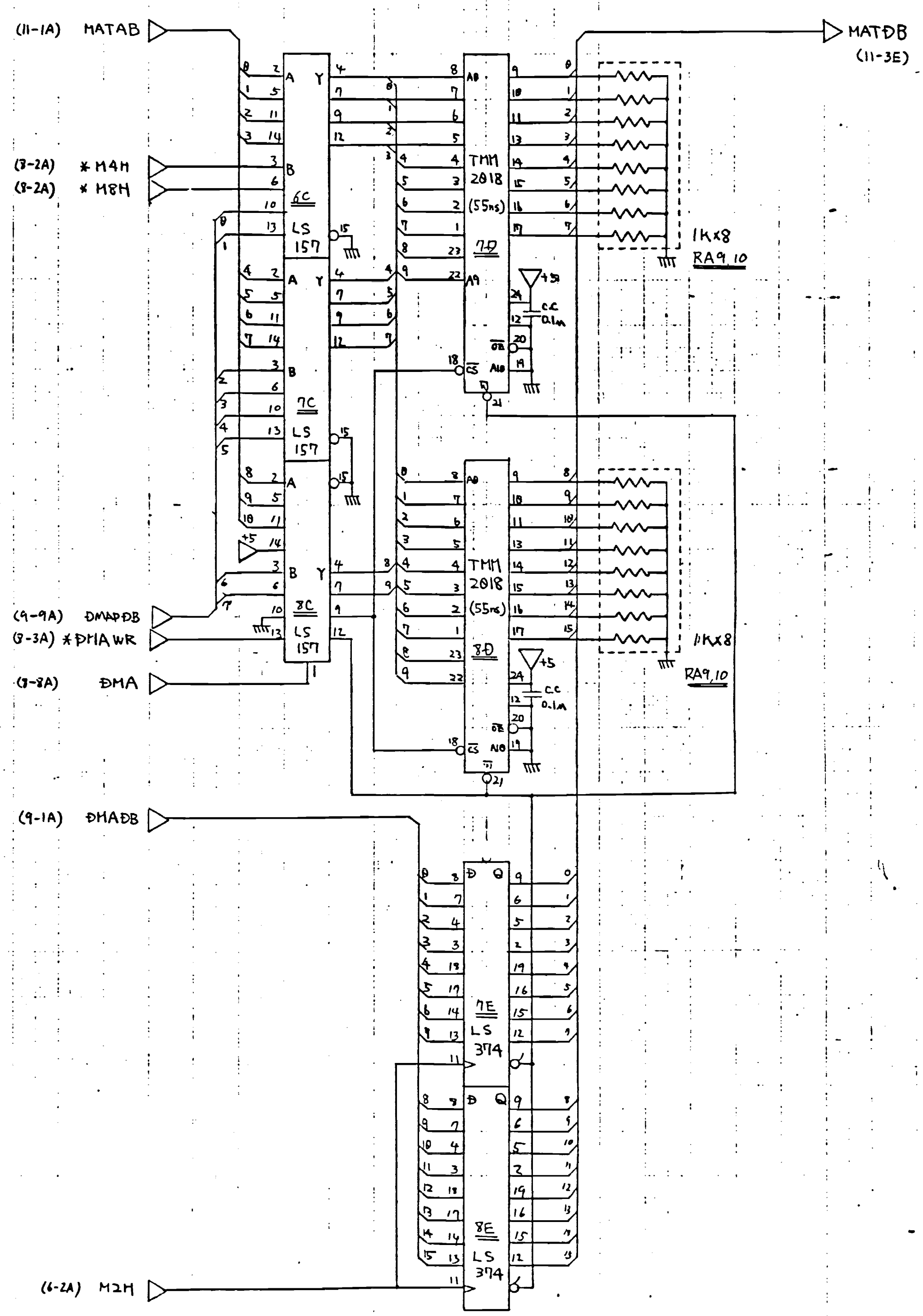
データイースト

関連番号

仕様、名称



DE-0297 PCB 9/17



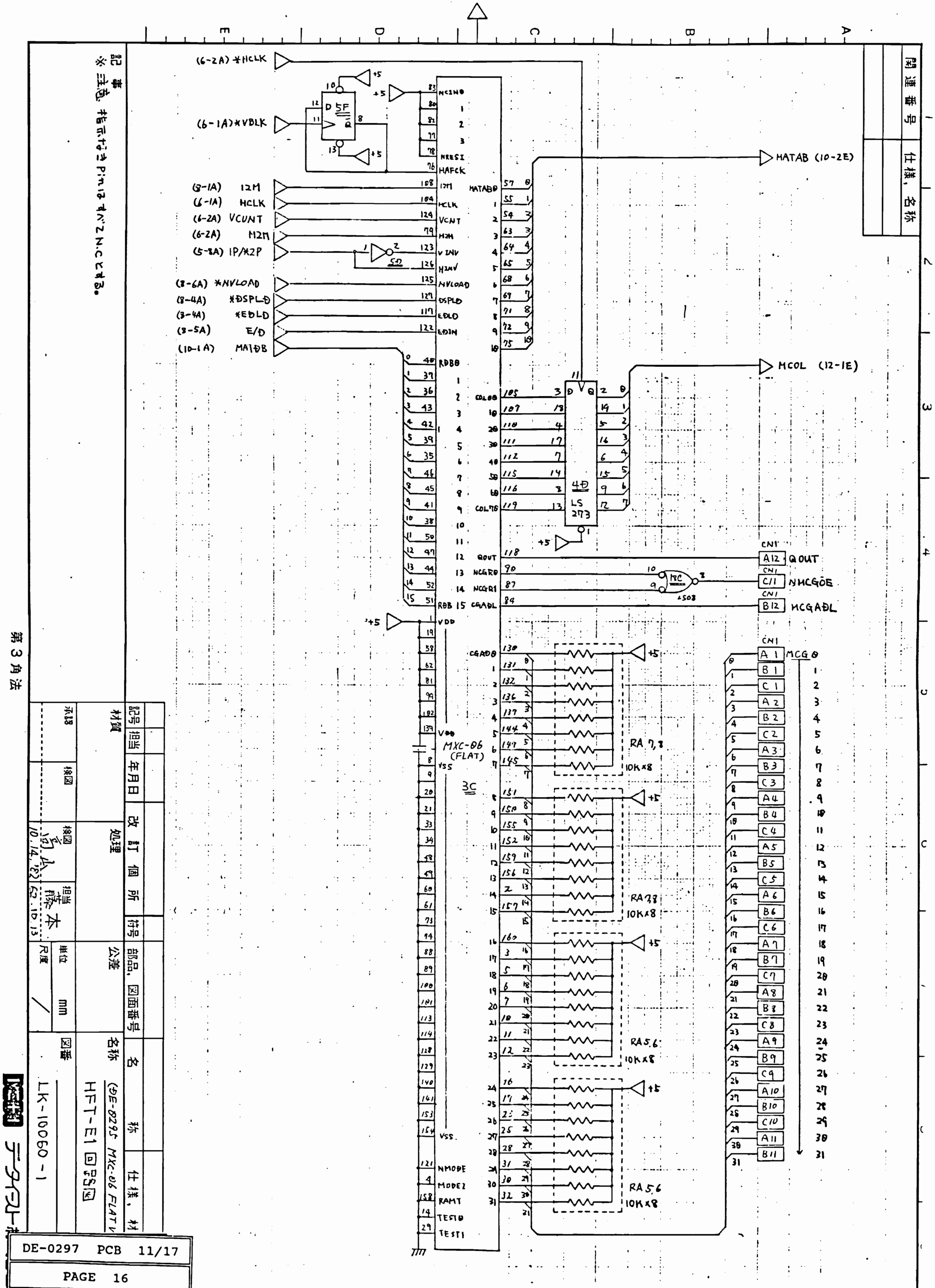
第3角法

HFT-E1 回路図

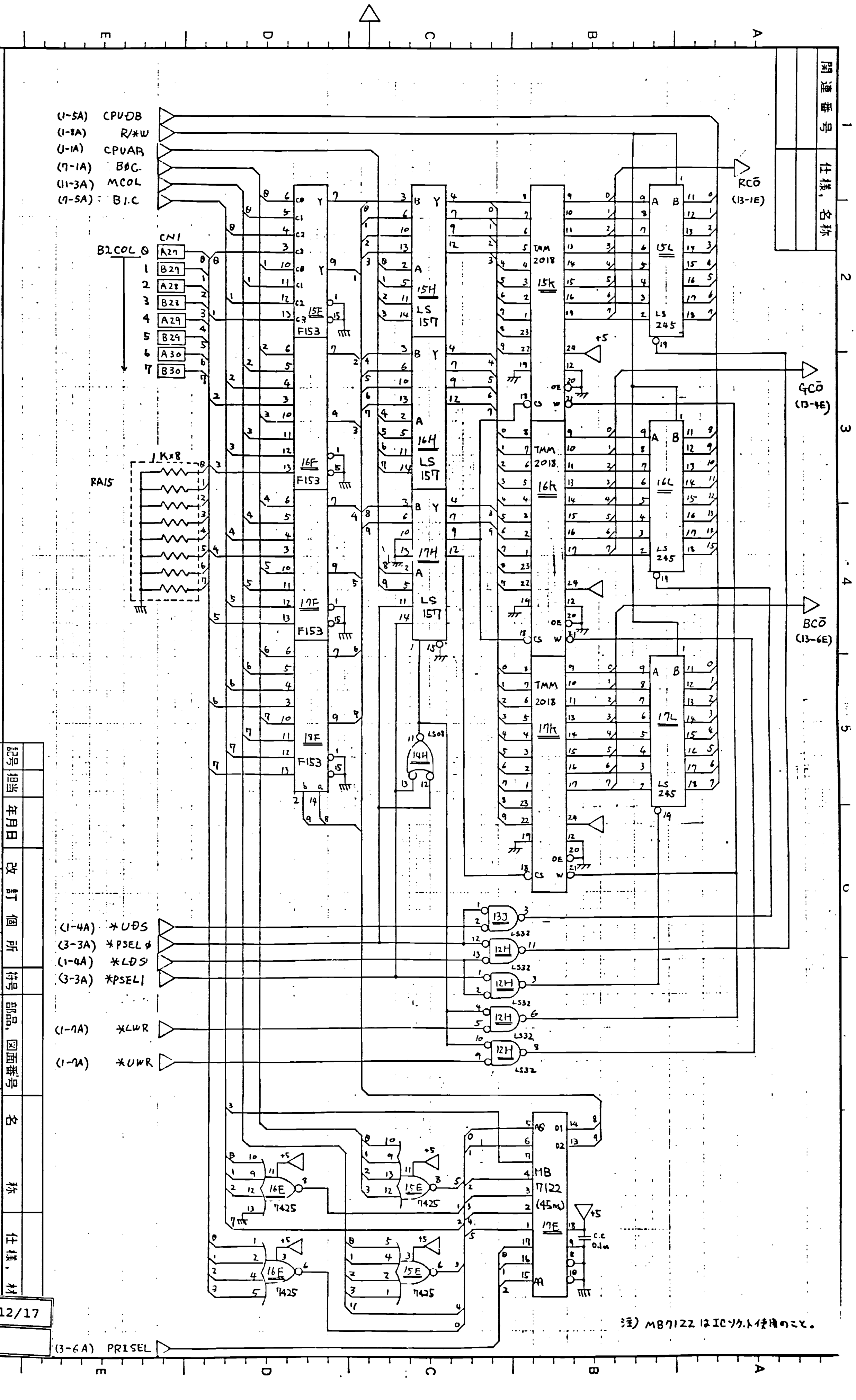
LK-10060-1

DE-0297 PCB 10/17

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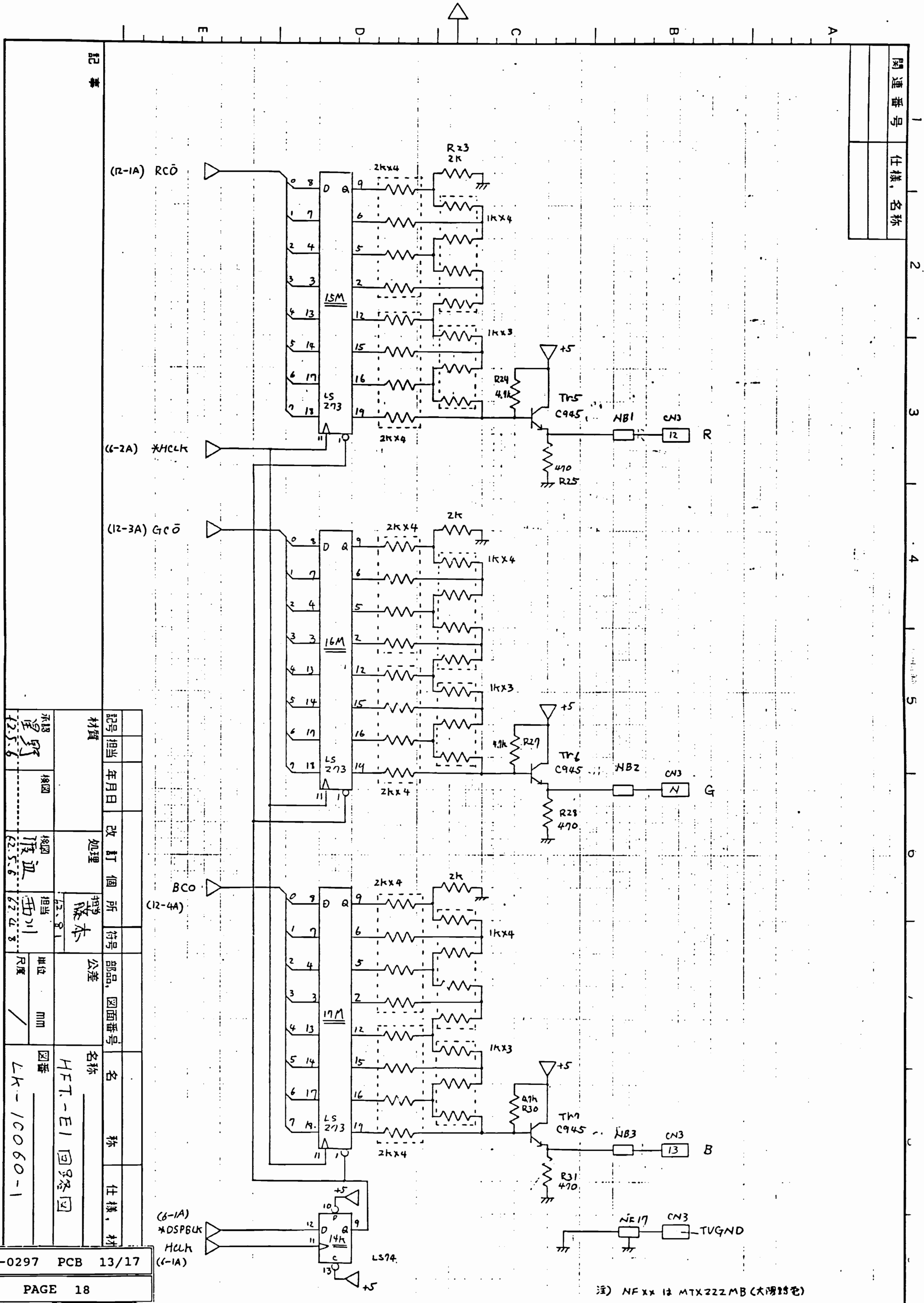
(6-2A) *HCLK
(6-1A) *VBLK
5F
(8-1A) 12M
(6-1A) HCLK
(6-2A) VCUNT
(6-2A) H2M
(5-8A) IP/*2P
(8-6A) *NVLOAD
(8-4A) *DSPLD
(8-4A) *EDLD
(8-5A) E/D
(10-1A) MAIDB
HATAB (10-2E)
MCOL (12-1E)
4D
LS 273
QOUT
NMCGOE
MCGADL
MCG 0
MXC-06 (FLAT)
3C
RA 7,8 10K×8
RA 3,4 10K×8
RA 5,6 10K×8
VDD
VSS
NMODE
MODE2
RAMT
TEST0
TEST1
関連番号
仕様, 名称
記事
※ 注記 指示なきPinはすべてN.C とする。
第3角法
HFT-E1 回路図
(DE-0295 MXC-06 FLAT)
LK-10060-1
データイースト



第3角法

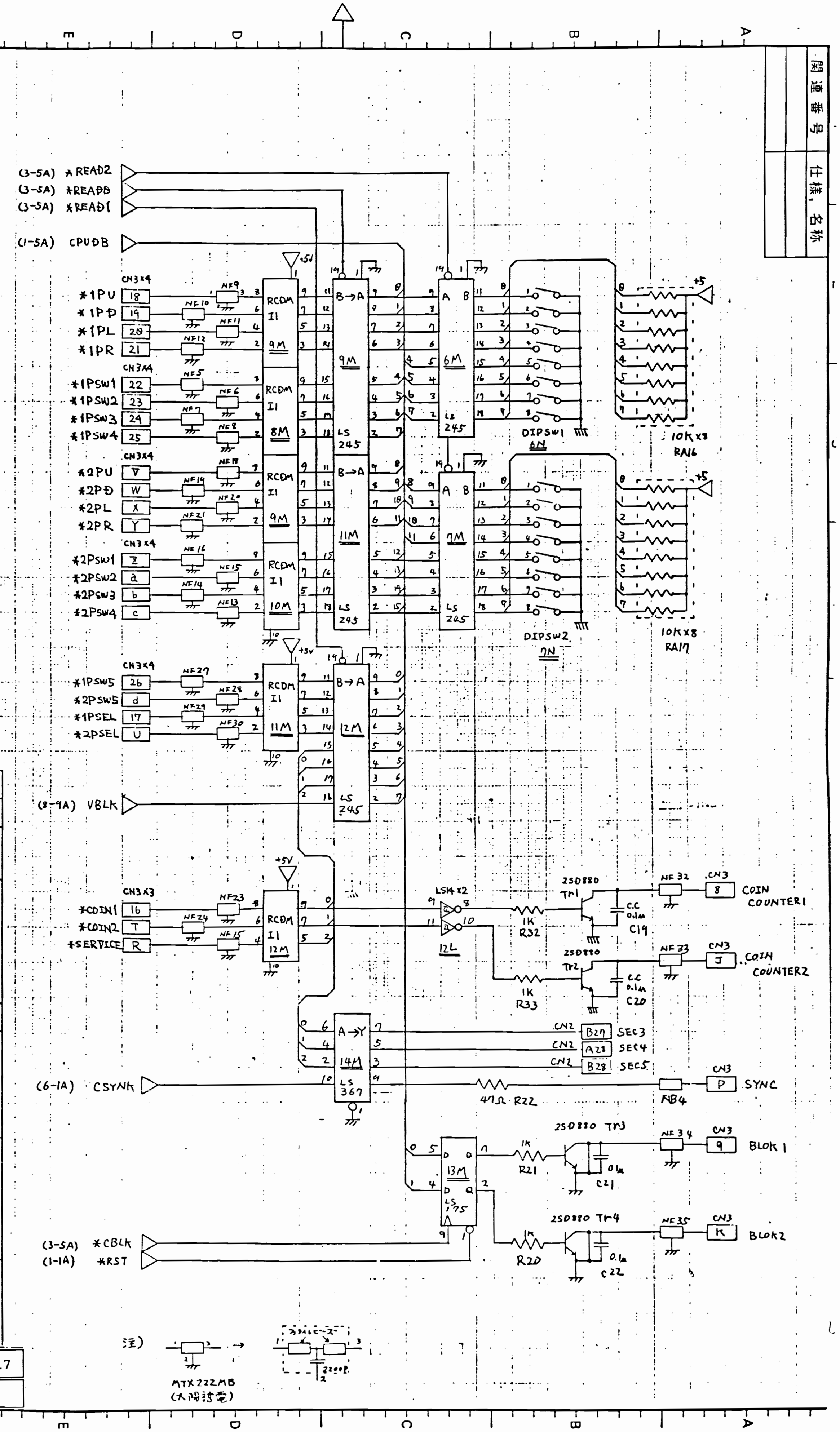
名称	HFT-E1 回路図
図番	LK-10060-1
単位	mm
尺度	/
製図	62.5.6
検図	62.5.6
承認	62.4.7
担当	62.2.10

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DE-0297 PCB 13/17

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関連番号

仕様、名称

記事

第3角法

名称: HFT-E1 回路図

図番: LK-10060-1

データイースト

設計 渡辺 62.5.6

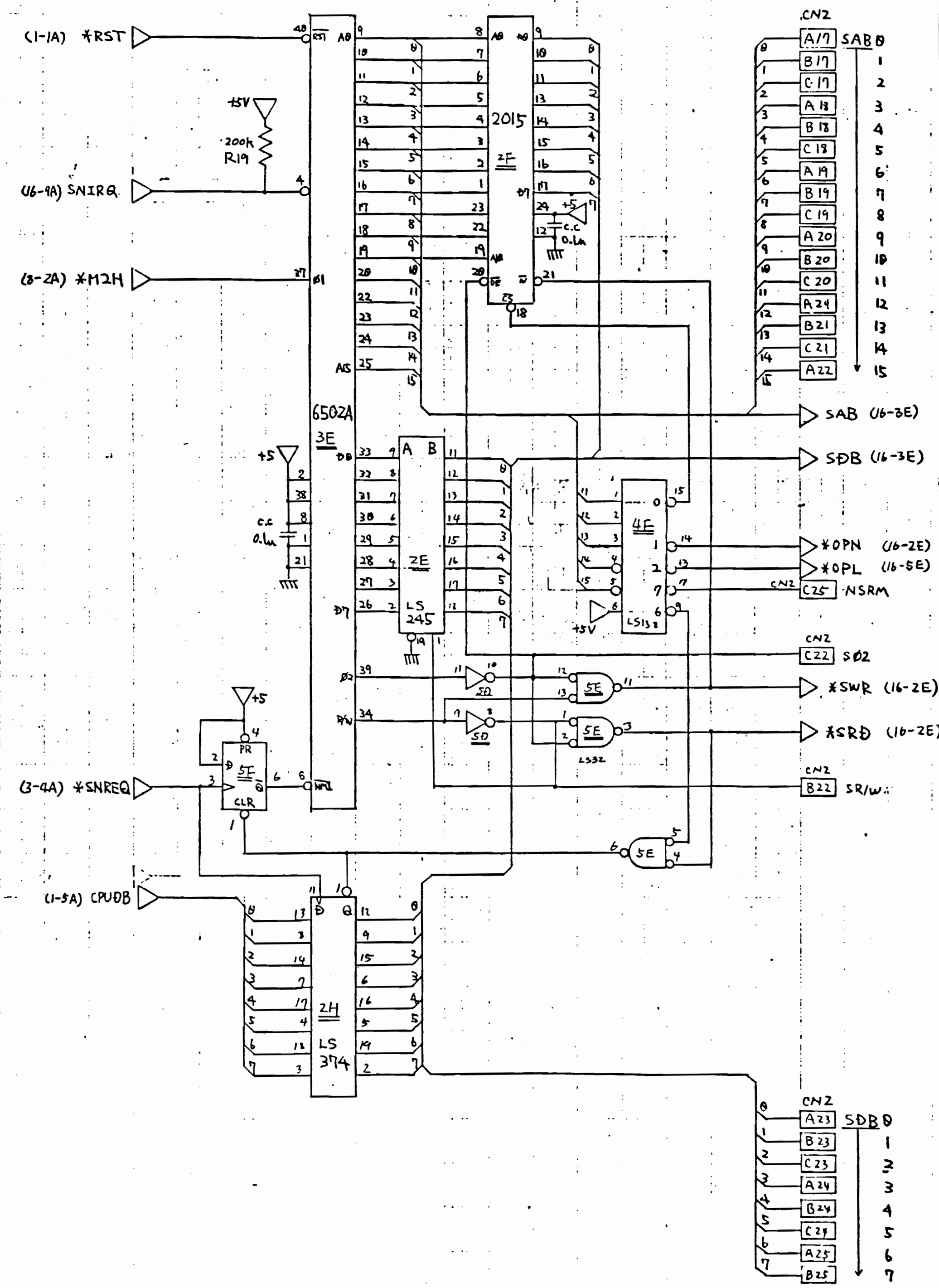
製図 渡辺 62.5.6

検図 西川 62.4.7

承認 長田 62.2.10

担当 藤本

単位 mm



注) 6502Aは、CN2の近くに配置すること。

記事

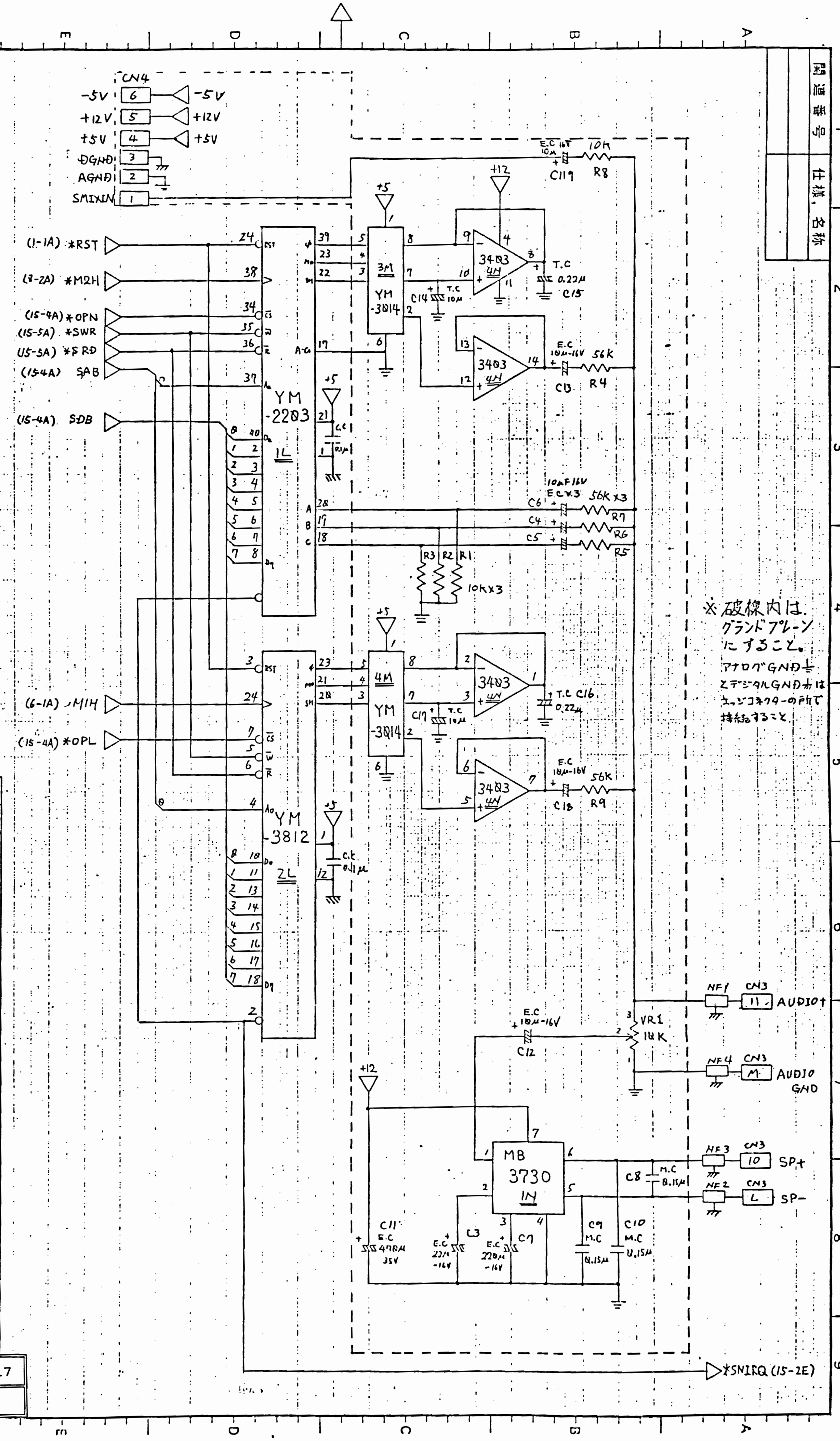
第3角法

名称: HFT-E1 回路図

図番: LK-10060-1

単位: mm

データイースト株式会社



記事

第3角法

材質

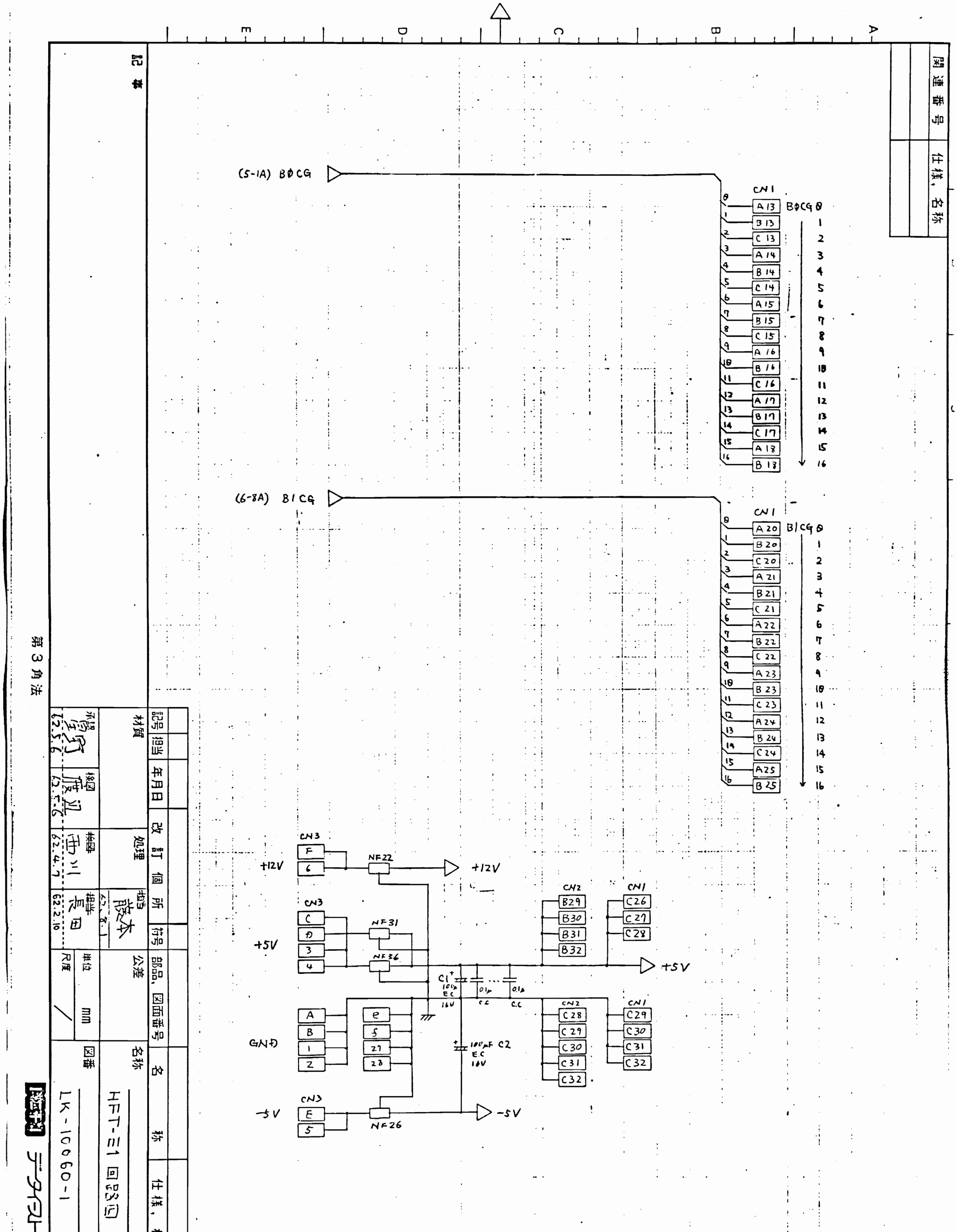
名称 HFT-E1 回路図

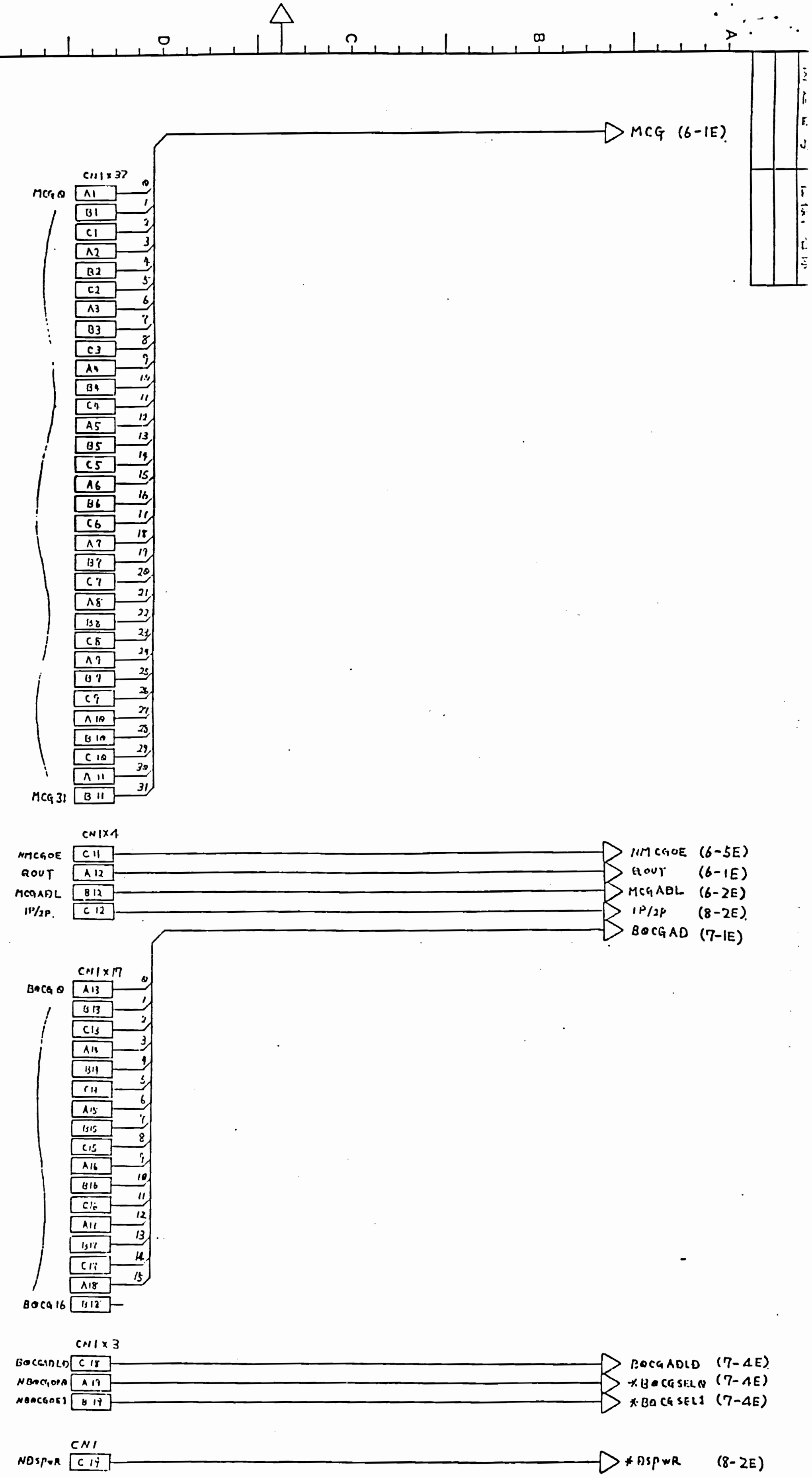
図番 LK-10060-1

単位 mm

DE-0297 PCB 16/17

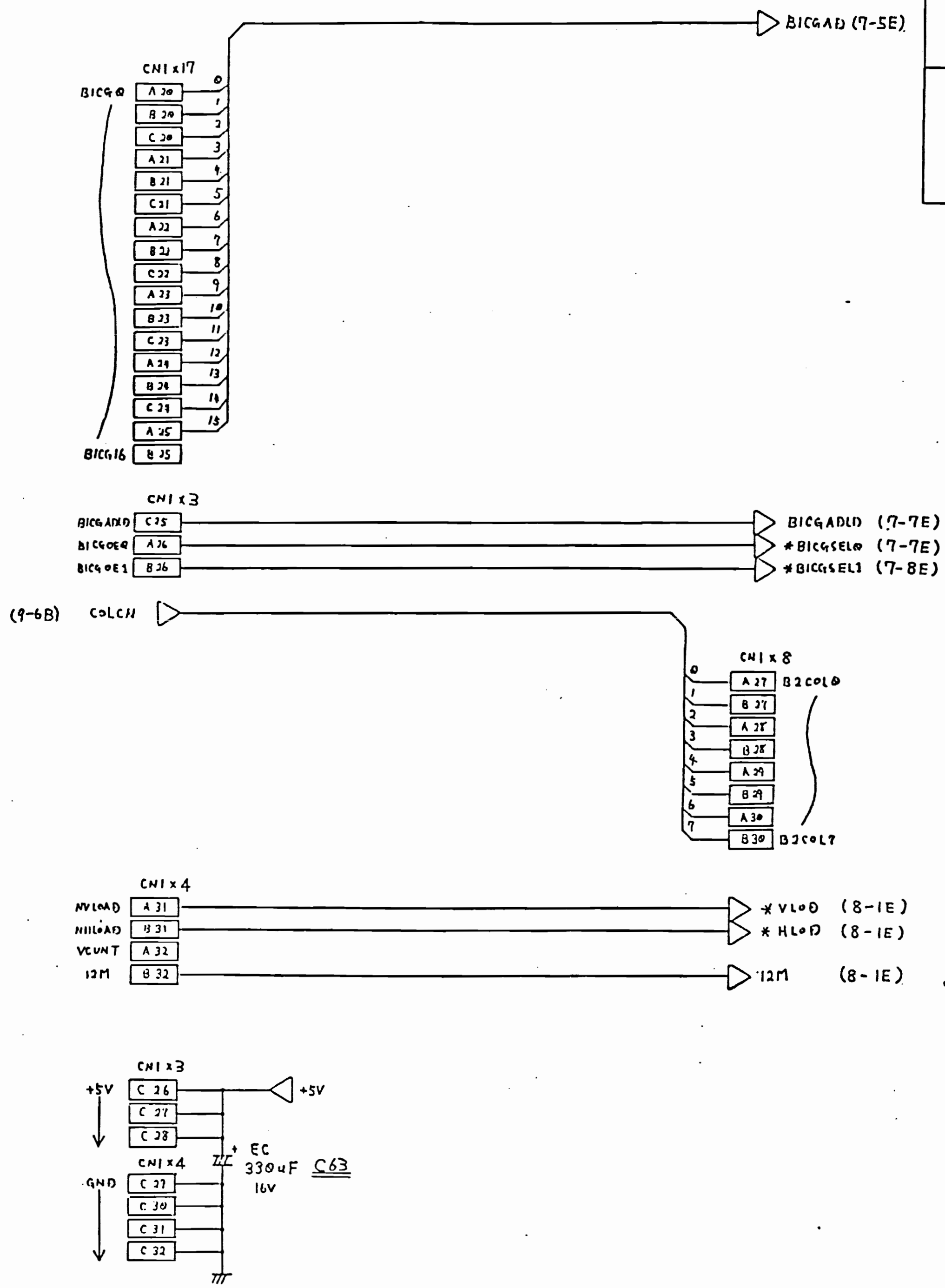
PAGE 21


関連番号
仕様、名称
(5-1A) BΦCG
CN1
A13 B13 C13 A14 B14 C14 A15 B15 C15 A16 B16 C16 A17 B17 C17 A18 B18
BΦCG 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
(6-8A) B1CG
CN1
A20 B20 C20 A21 B21 C21 A22 B22 C22 A23 B23 C23 A24 B24 C24 A25 B25
B1CG 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
CN3
F
6
+12V
NF22
+12V
CN3
C
D
3
4
+5V
NF31
NF36
CN2
B29 B30 B31 B32
CN1
C26 C27 C28
+5V
C1
10μ
E.C
16V
0.1μ
C.C
0.1μ
C.C
CN2
C28 C29 C30 C31 C32
CN1
C29 C30 C31 C32
A
B
1
2
e
5
27
28
GND
100μF C2
E.C
16V
CN3
E
5
-5V
NF26
-5V
記事
第3角法
材質
承認
62.5.6
検図
62.5.6
製図
62.4.7
設計
62.2.10
担当
膝本
単位 mm
尺度
公差
名称
HFT-E1 回路図
図番
LK-10060-1
記号
担当
年月日
改訂個所
符号
部品、図面番号
名称
仕様、材
データイースト株
E D C B A



SB BOARD
PCB-81
NOV 14 198

DE-0316 PCB 1/14

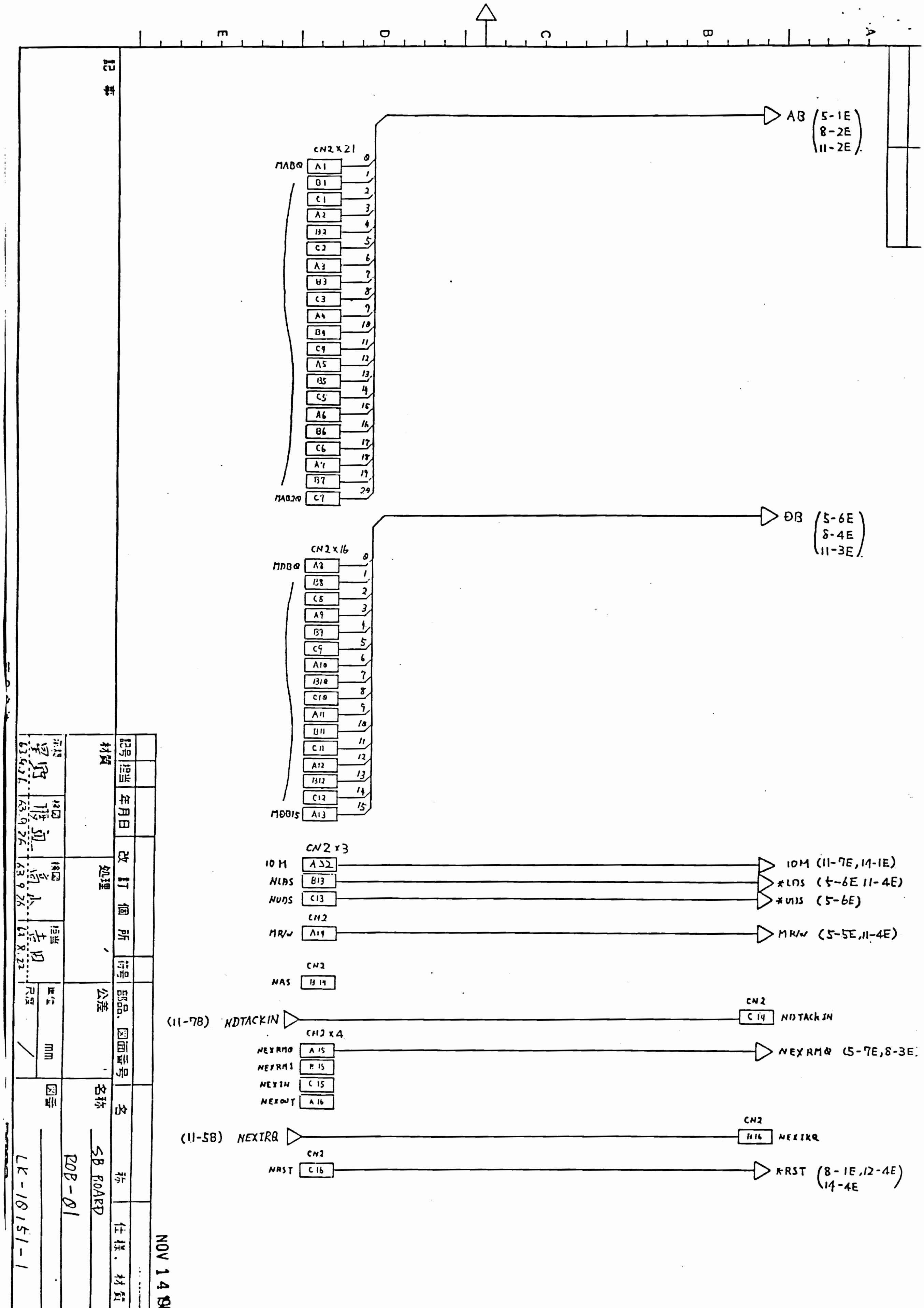


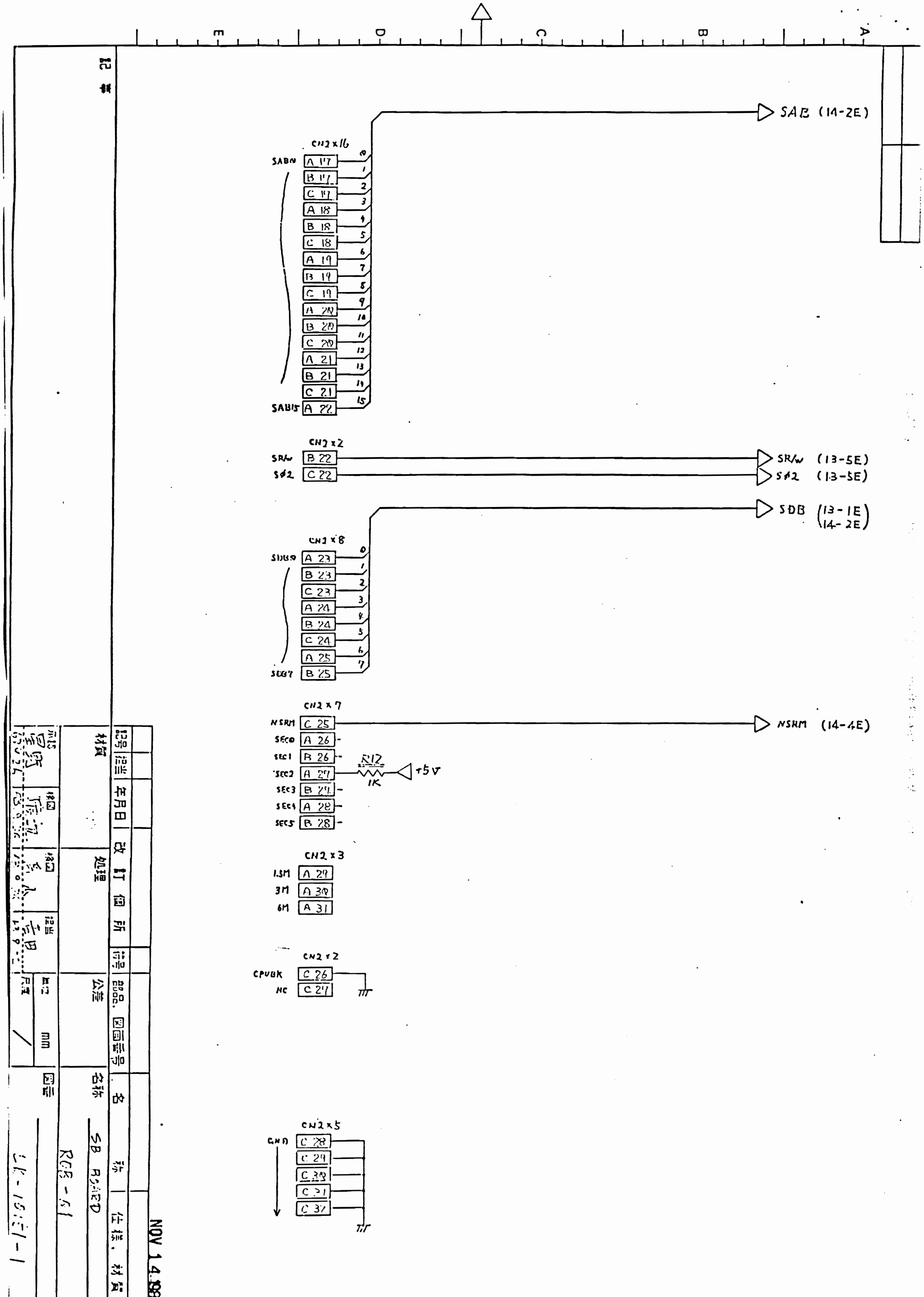
NOV 14 1988

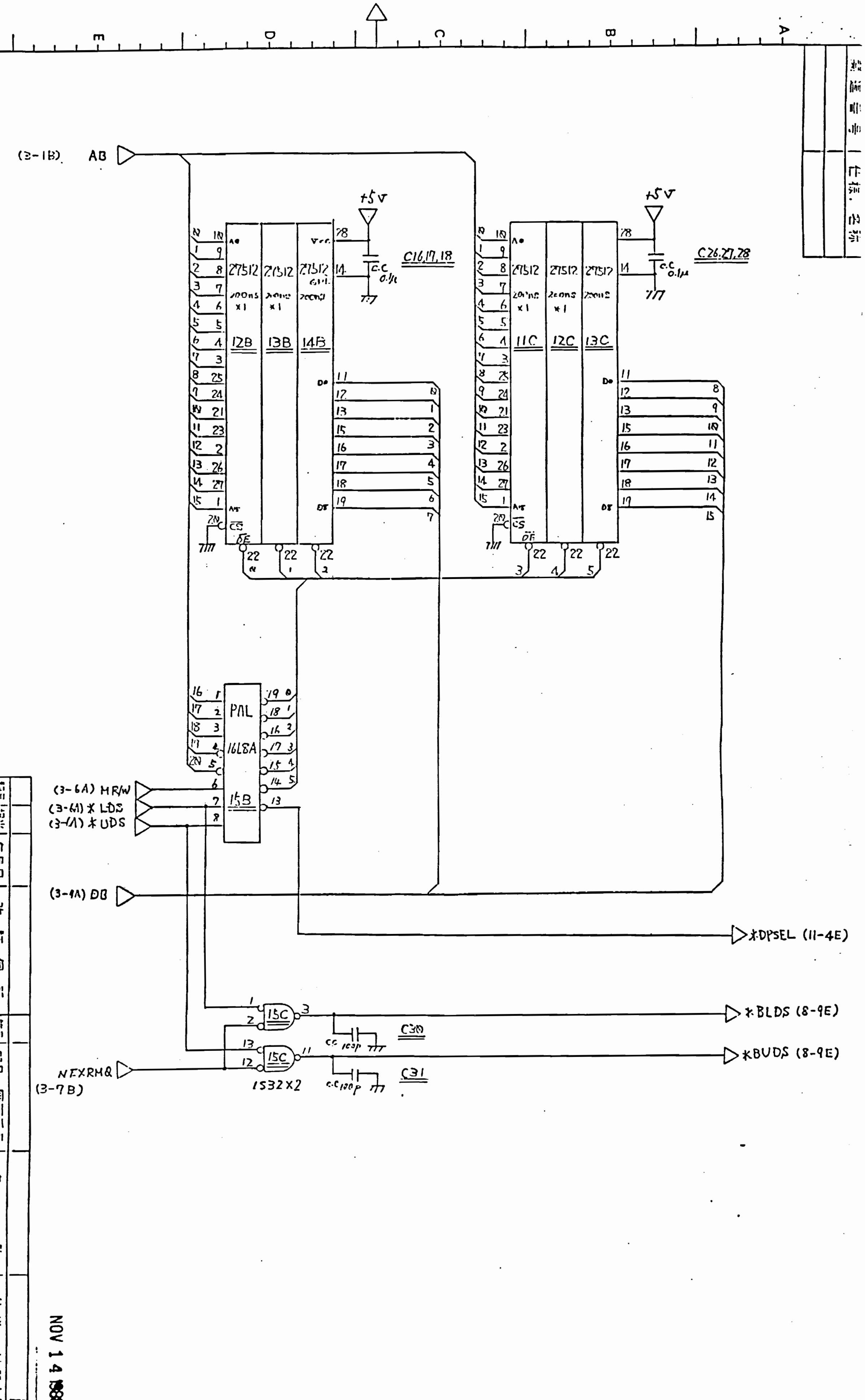
SB BOARD

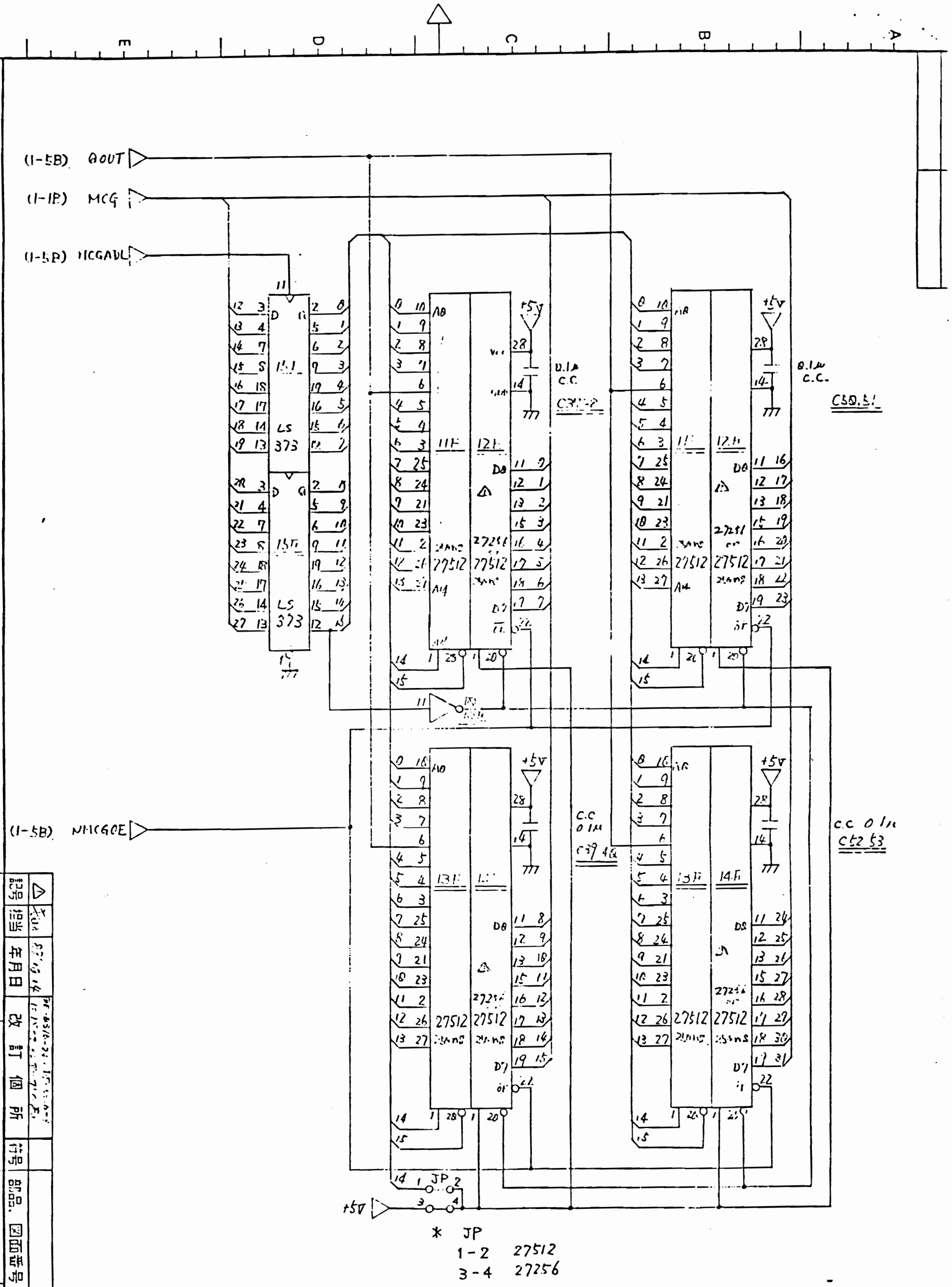
PCB-01

LK-10151-1

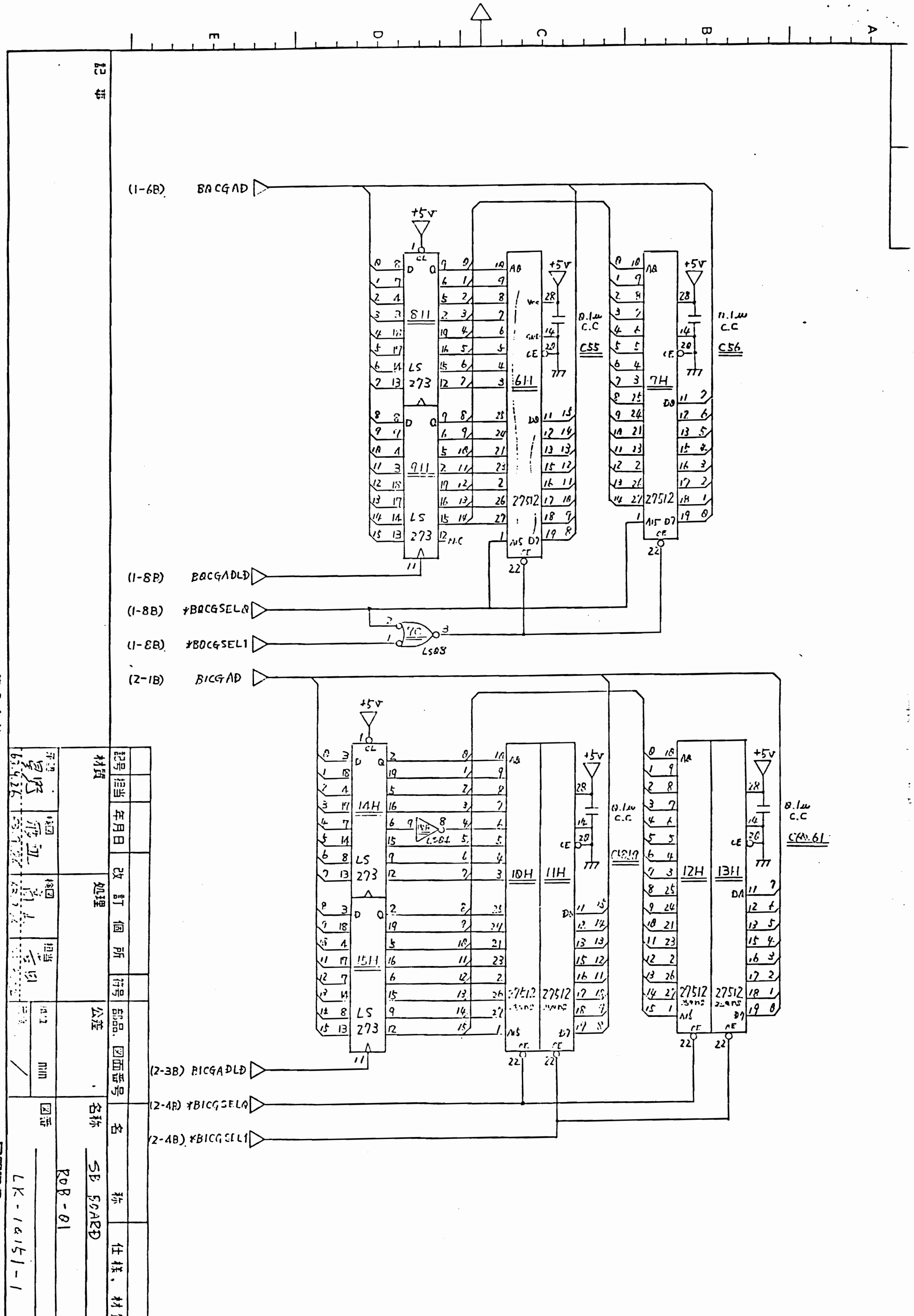

CN2 x21
MAB0
MAB20
AB (5-1E, 8-2E, 11-2E)
CN2 x16
MDB0
MDB15
DB (5-6E, 8-4E, 11-3E)
CN2 x3
10M
NLDS
NUDS
10M (11-7E, 14-1E)
*LDS (5-6E 11-4E)
*UDS (5-6E)
MR/W
MR/W (5-5E, 11-4E)
NAS
(11-7B) NDTACKIN
NDTACKIN
CN2 x4
NEXRMQ
NEXRM1
NEXIN
NEXOUT
NEXRMQ (5-7E, 8-3E)
(11-5B) NEXTRQ
NEXTRQ
NRST
*RST (8-1E, 12-4E, 14-4E)
SB BOARD
BDB-01
LK-10151-1
NOV 14 1988

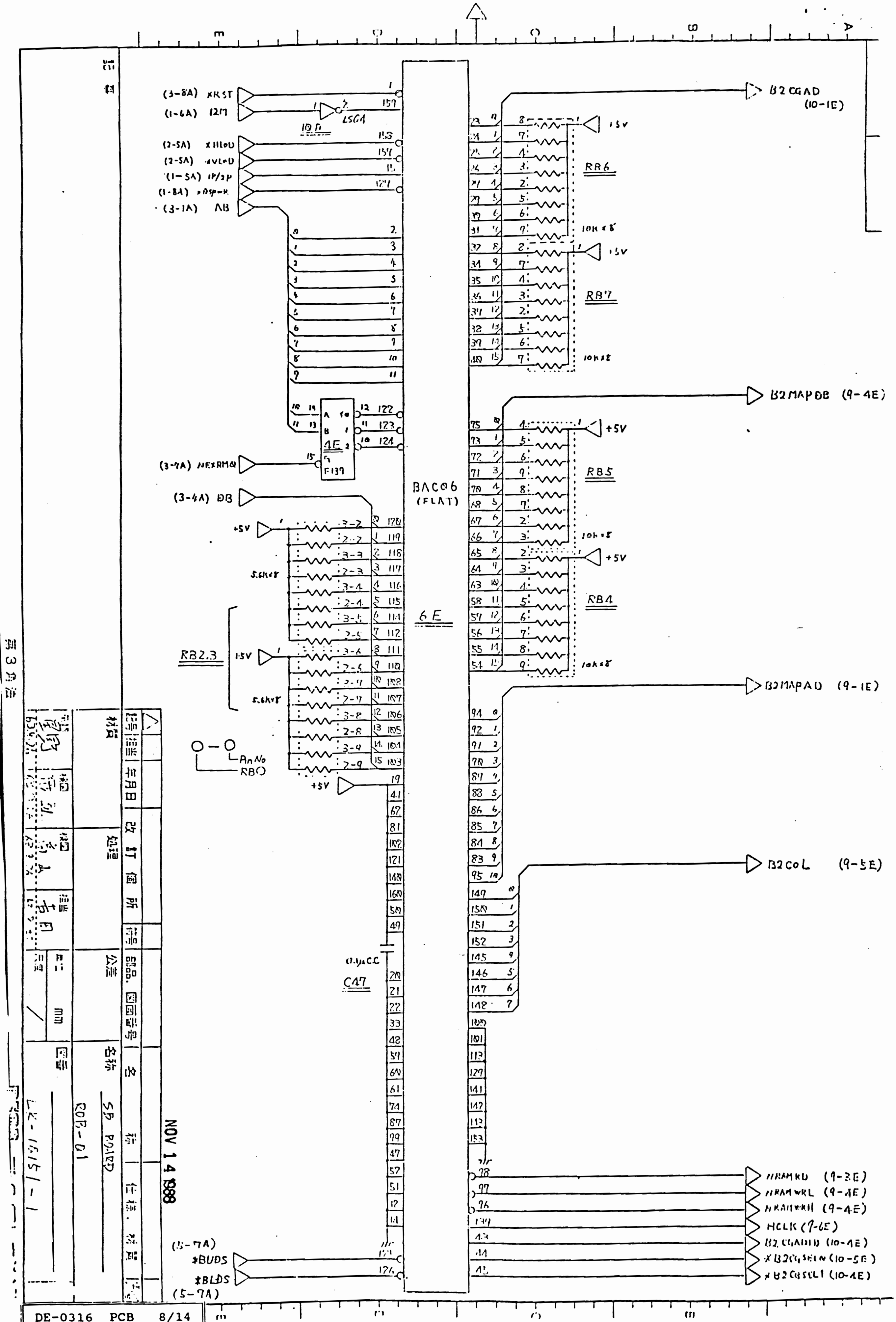

SAB (14-2E)
CN2 x16
SAB0
A 17
B 17
C 17
A 18
B 18
C 18
A 19
B 19
C 19
A 20
B 20
C 20
A 21
B 21
C 21
SAB15
A 22
CN2 x2
SR/W
B 22
Sφ2
C 22
SR/W (13-5E)
Sφ2 (13-5E)
SDB (13-1E) (14-2E)
CN2 x8
SDB0
A 23
B 23
C 23
A 24
B 24
C 24
A 25
SDB7
B 25
CN2 x7
NSRM
C 25
SEC0
A 26
SEC1
B 26
SEC2
A 27
SEC3
B 27
SEC4
A 28
SEC5
B 28
R12
1K
+5V
NSRM (14-4E)
CN2 x3
1.5M
A 29
3M
A 30
6M
A 31
CN2 x2
CPUBK
C 26
NC
C 27
CN2 x5
GND
C 28
C 29
C 30
C 31
C 32
SB BOARD
NOV 14 1988

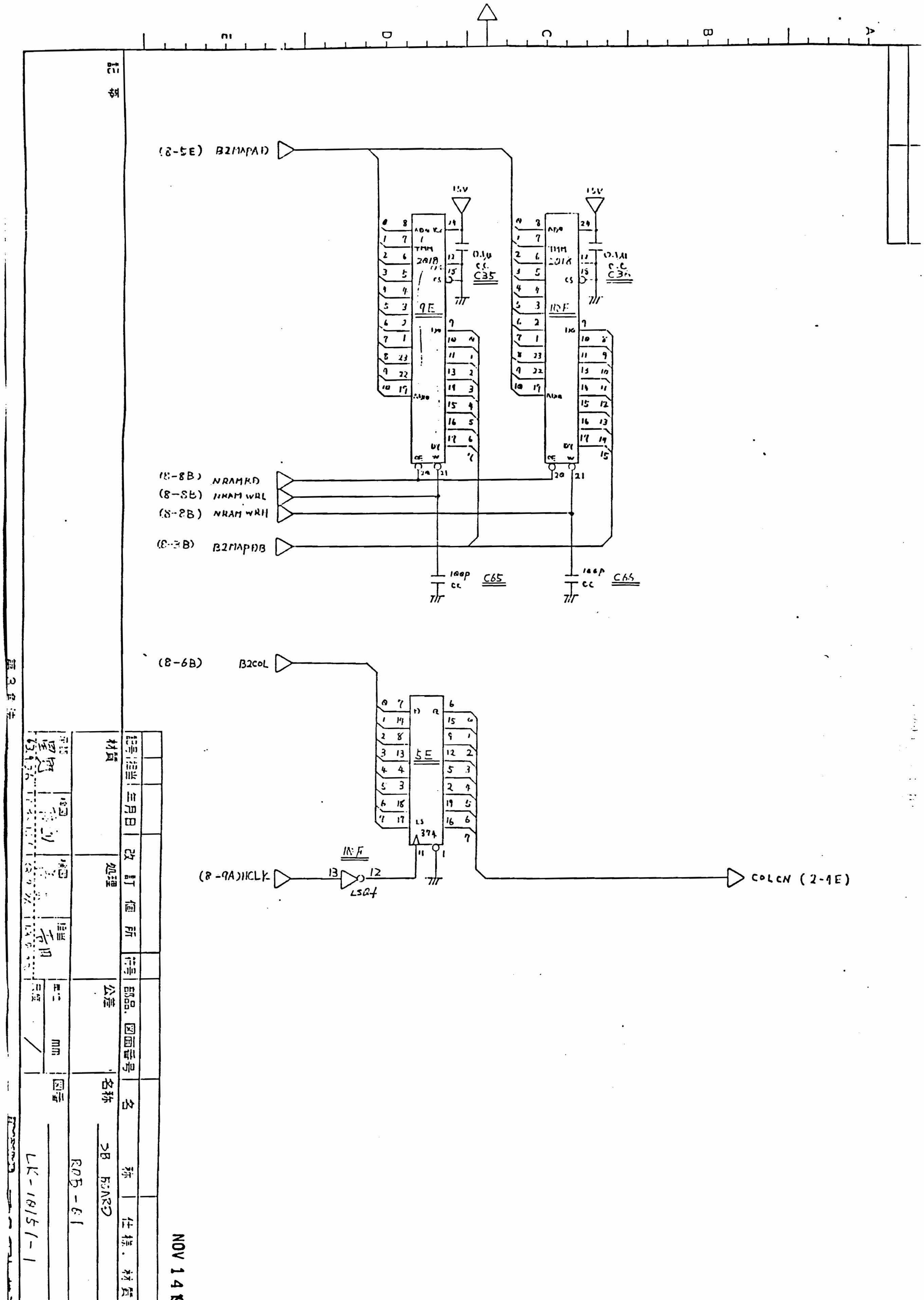

(3-1B) AB
+5V
27512
200ns
12B
13B
14B
C16,17,18
C.C 0.1μ
11C
12C
13C
C26,27,28
PAL
16L8A
15B
(3-6A) MR/W
(3-6A) *LDS
(3-6A) *UDS
(3-4A) DB
*DPSEL (11-4E)
15C
*BLDS (8-9E)
*BUDS (8-9E)
C30
C31
NEXRMQ
(3-7B)
1S32X2
NOV 14 1988

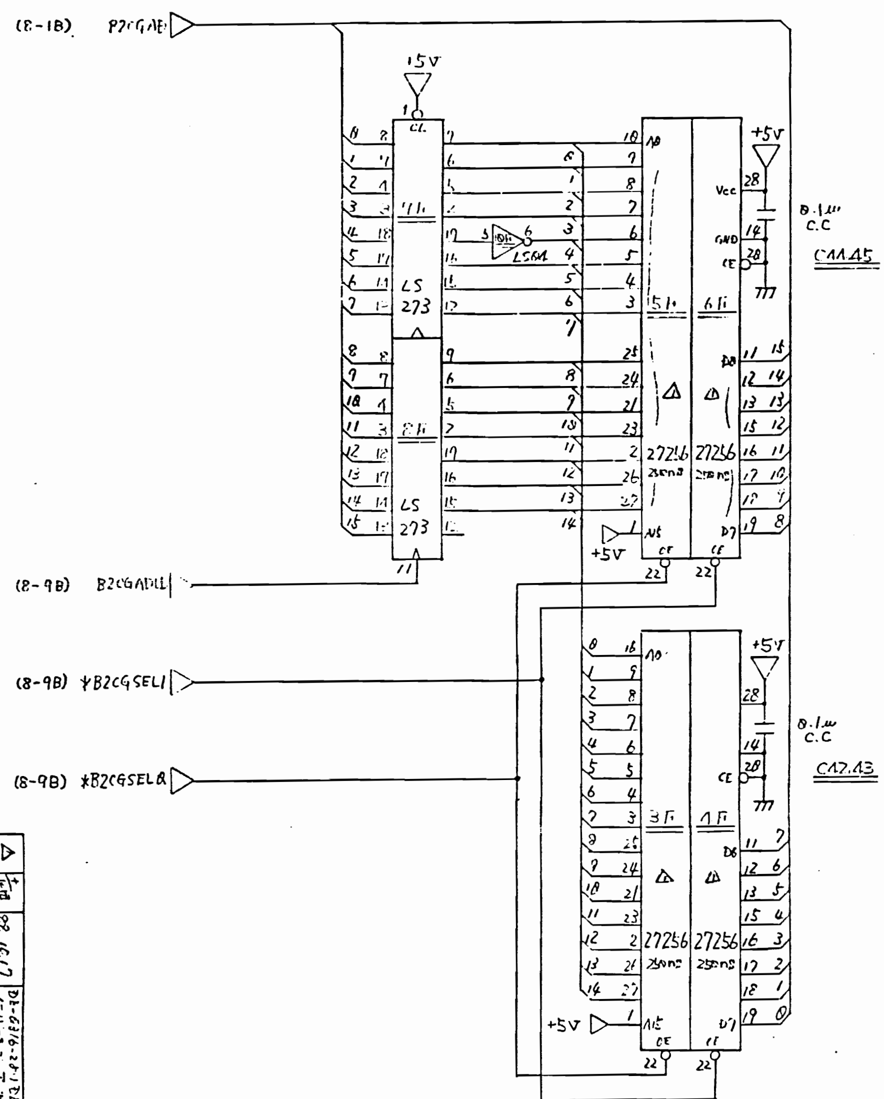


(1-5B) QOUT
(1-1B) MCG
(1-5B) MCGADL
(1-5B) NMCGOE
LS 373
27512
11F
12F
11H
12H
13F
14F
13H
14H
+5V
0.1μ C.C.
C.C 0.1μ
* JP
1-2 27512
3-4 27256


(1-6B) BACGAD
(1-8B) BACGADLD
(1-8B) *BACGSEL0
(1-8B) *BACGSEL1
(2-1B) BICGAD
(2-3B) BICGADLD
(2-4B) *BICGSEL0
(2-4B) *BICGSEL1
+5V
8H LS 273
9H LS 273
6H 27512
7H 27512
7C LS08
0.1u C.C C55
0.1u C.C C56
14H LS 273
15H LS 273
10H 27512
11H 27512
12H 27512
13H 27512
SB BOARD
ROB-01
LK-16151-1


XRST
12M
LSG4
10D
(3-8A)
(1-6A)
(3-1A) AB
4E
F139
(3-7A) NEXRMQ
(3-4A) DB
+5V
5.6K×8
RB2,3
BAC06
(FLAT)
6E
0.1μCC
C47
RB6
RB7
RB5
RB4
10K×8
B2CGAD (10-1E)
B2MAPDB (9-4E)
B2MAPAD (9-1E)
B2COL (9-5E)
HCLK (9-6E)
*BUDS
*BLDS
(5-7A)
RBO
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SP BOARD
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(8-5E) B2MAPAD
+5V
0.1μ CC C35
TMM 2018
9E
10F
(8-8B) NRAMRD
(8-8B) NRAM WRL
(8-8B) NRAM WRH
(8-3B) B2MAPDB
100p CC C65
(8-6B) B2COL
5E
374
10F
(8-9A) HCLK
LS04
COLCN (2-4E)
ROB-61
LK-1815-1
NOV 14

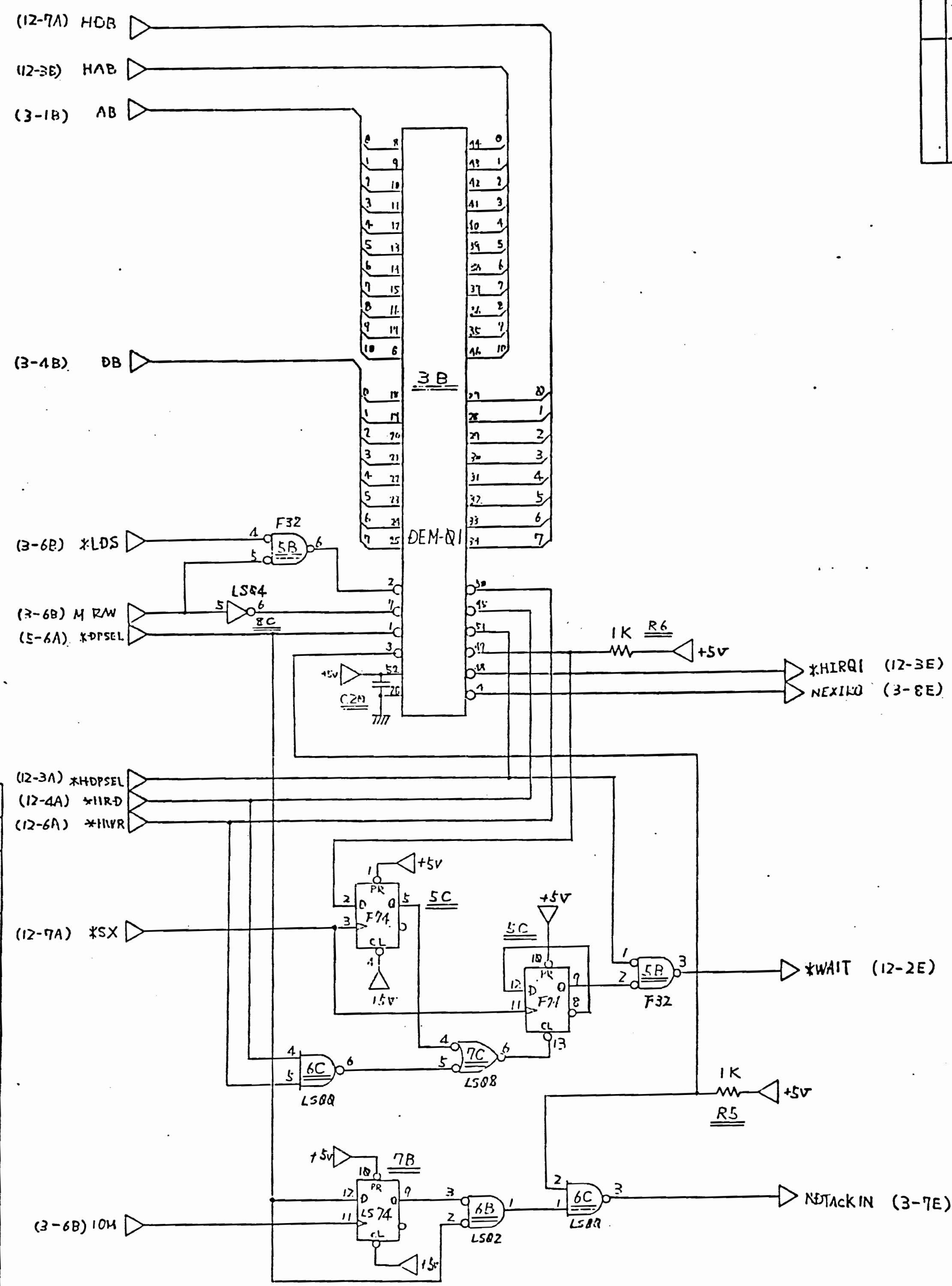


SB BOARD

PCB-61

LK-16151-1

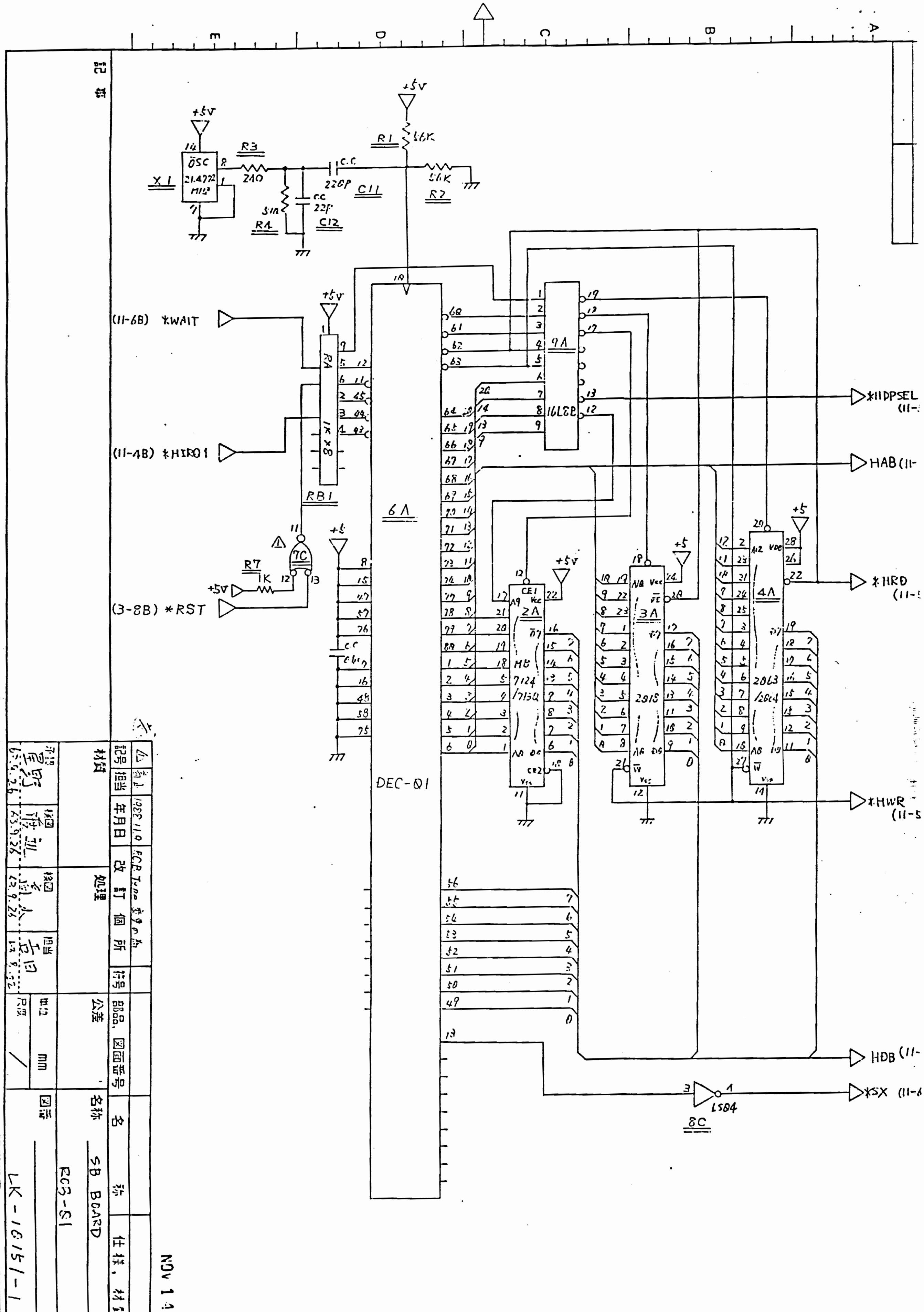
NOV 14



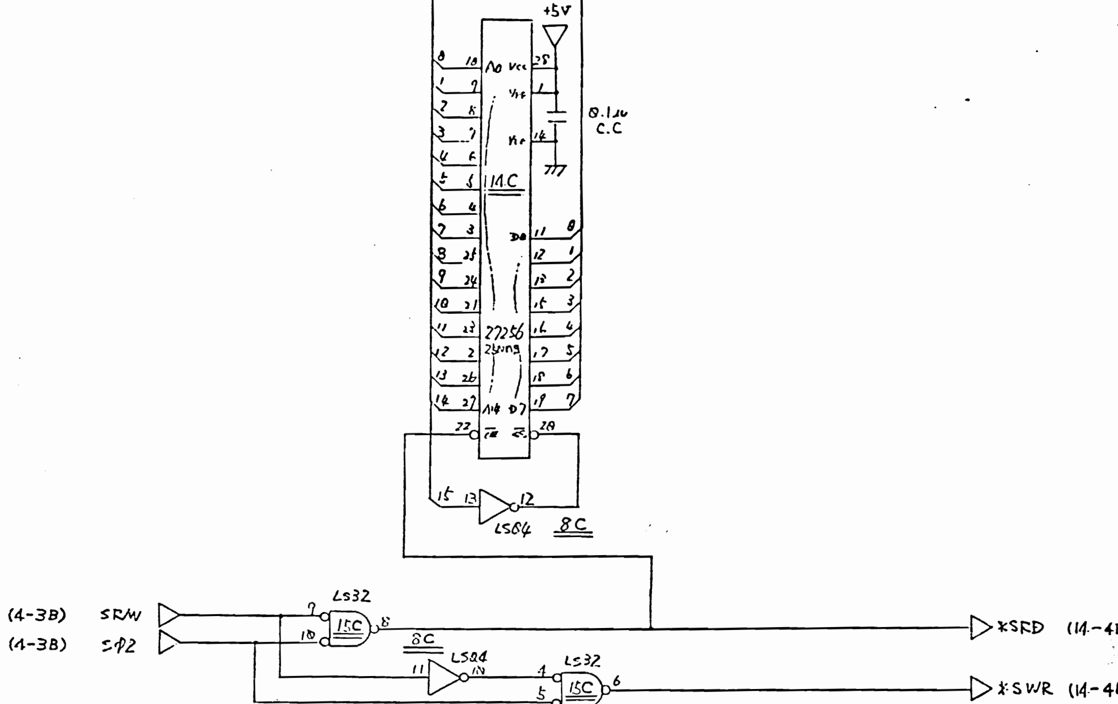
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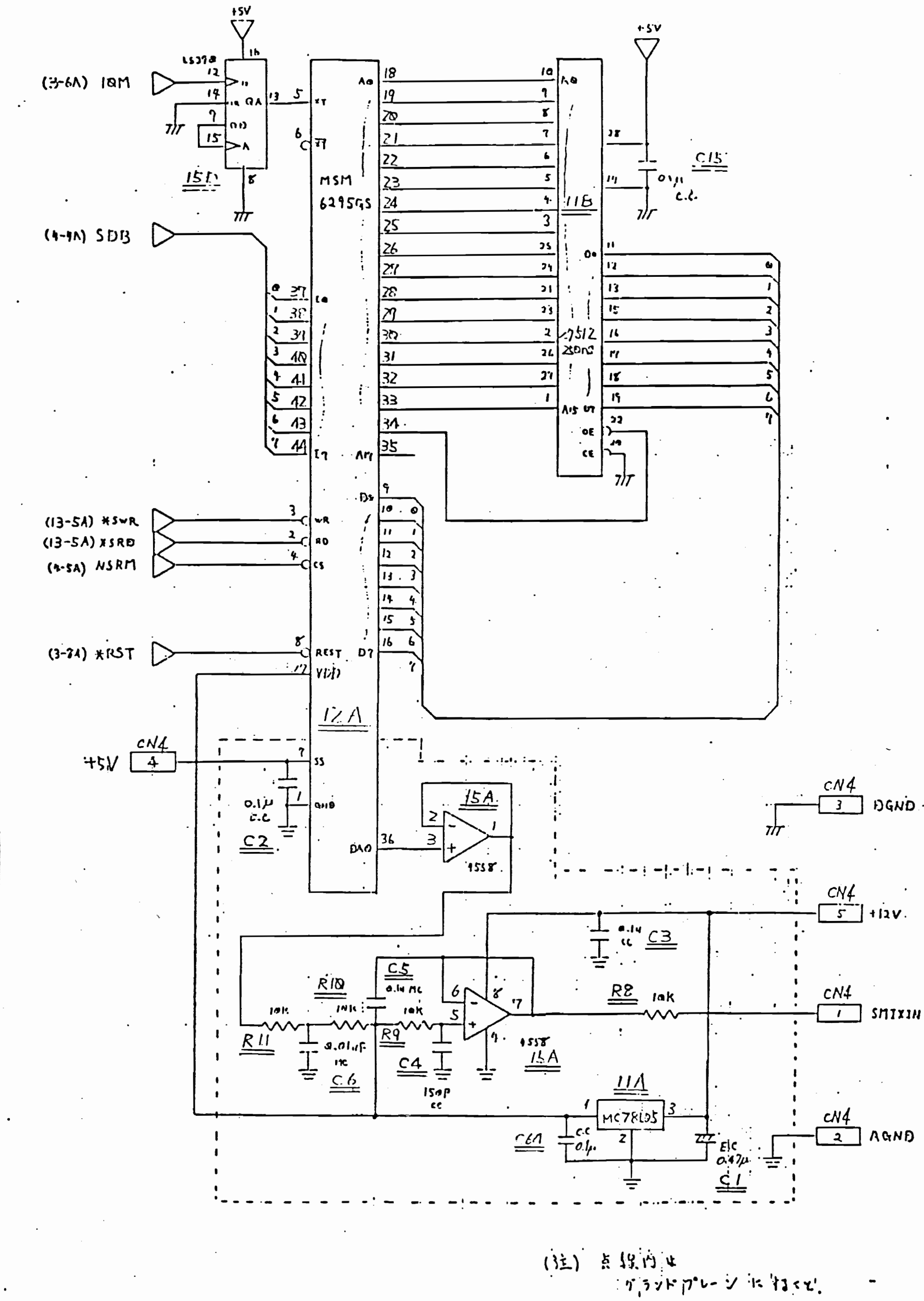


+5V
X1
OSC
21.4772 MHz
R3
240
C11
22P
C12
R4
R1
56K
R2
(11-6B) *WAIT
(11-4B) *HIRO1
(3-8B) *RST
RA
RB1
1K×8
7C
R7
1K
6A
DEC-01
9A
16L8B
2A
HB 7124/7134
3A
2918
4A
2063/2064
*IIDPSEL
HAB
*HRD
*HWR
HDB
*SX
LS04
8C
SB BOARD
ECS-S1
LK-1615/-1
記事
材質
処理
公差
名称
仕様, 材質
改 訂 個 所
部品, 図面番号
NOV 14



SB BOARD

R05-81



(注) 点線内は
グランドプレーンにすること.

5. PCB EDGE CONNECTOR PIN-OUT

SOLDER SIDE	PIN	#	PARTS SIDE
GND	A	1	GND
GND	B	2	GND
+5V	C	3	+5V
+5V	D	4	+5V
	E	5	
+12V	F	6	+12V
MISTAKEN INPUT PREVENTION	H	7	MISTAKEN INPUT PREVENTION
COIN COUNTER 2	J	8	COIN COUNTER 1
(GND)	K	9	(GND)
SPEAKER (−)	L	10	SPEAKER (+)
AUDIO (GND)	M	11	AUDIO (+)
VIDEO GREEN	N	12	VIDEO RED
VIDEO SYNC	P	13	VIDEO BLUE
SERVICE SWITCH	R	14	VIDEO GND
	S	15	
COIN SWITCH 2	T	16	COIN SWITCH 1
START SWITCH 2	U	17	START SWITCH 1
2P CONTROL 1 UP	V	18	1P CONTROL 1 UP
2P CONTROL 2 DOWN	W	19	1P CONTROL 2 DOWN
2P CONTROL 3 LEFT	X	20	1P CONTROL 3 LEFT
2P CONTROL 4 RIGHT	Y	21	1P CONTROL 4 RIGHT
2P CONTROL 5 PUSH 1	Z	22	1P CONTROL 5 PUSH 1
2P CONTROL 6 PUSH 2	a	23	1P CONTROL 6 PUSH 2
2P CONTROL 7 PUSH 3	b	24	1P CONTROL 7 PUSH 3
2P CONTROL 8 SPARE 1	c	25	1P CONTROL 8 SPARE 1
2P CONTROL 9 SPARE 2	d	26	1P CONTROL 9 SPARE 2
GND	e	27	GND
GND	f	28	GND

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GAME LOGIC PRINTED CIRCUIT BOARD(S)	**90 DAYS**

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1. Seller is notified promptly upon discovery by buyer that stated products are defective.
2. Such products are properly packaged and then returned freight pre-paid, to a place specified by Seller.

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